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MARCH-APRIL 1949

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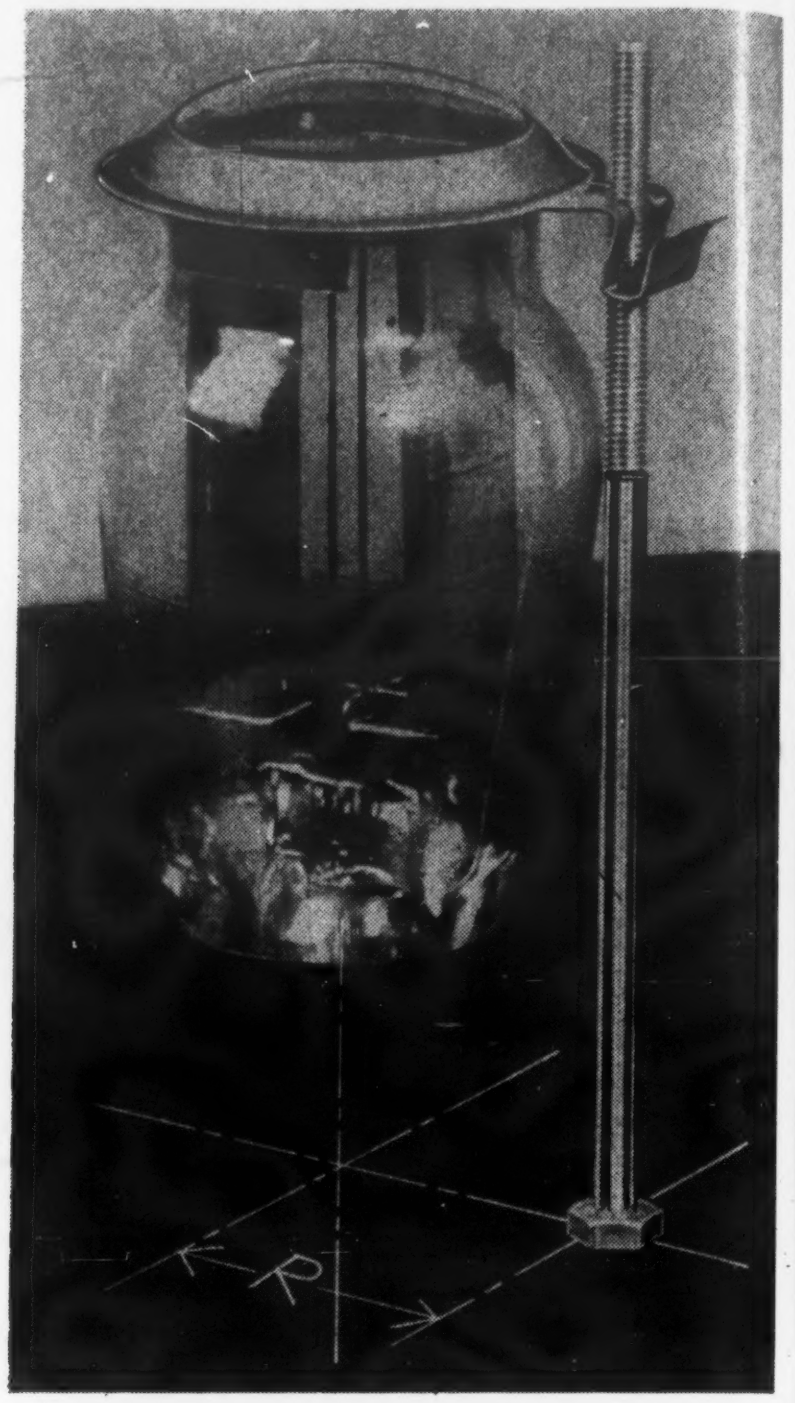

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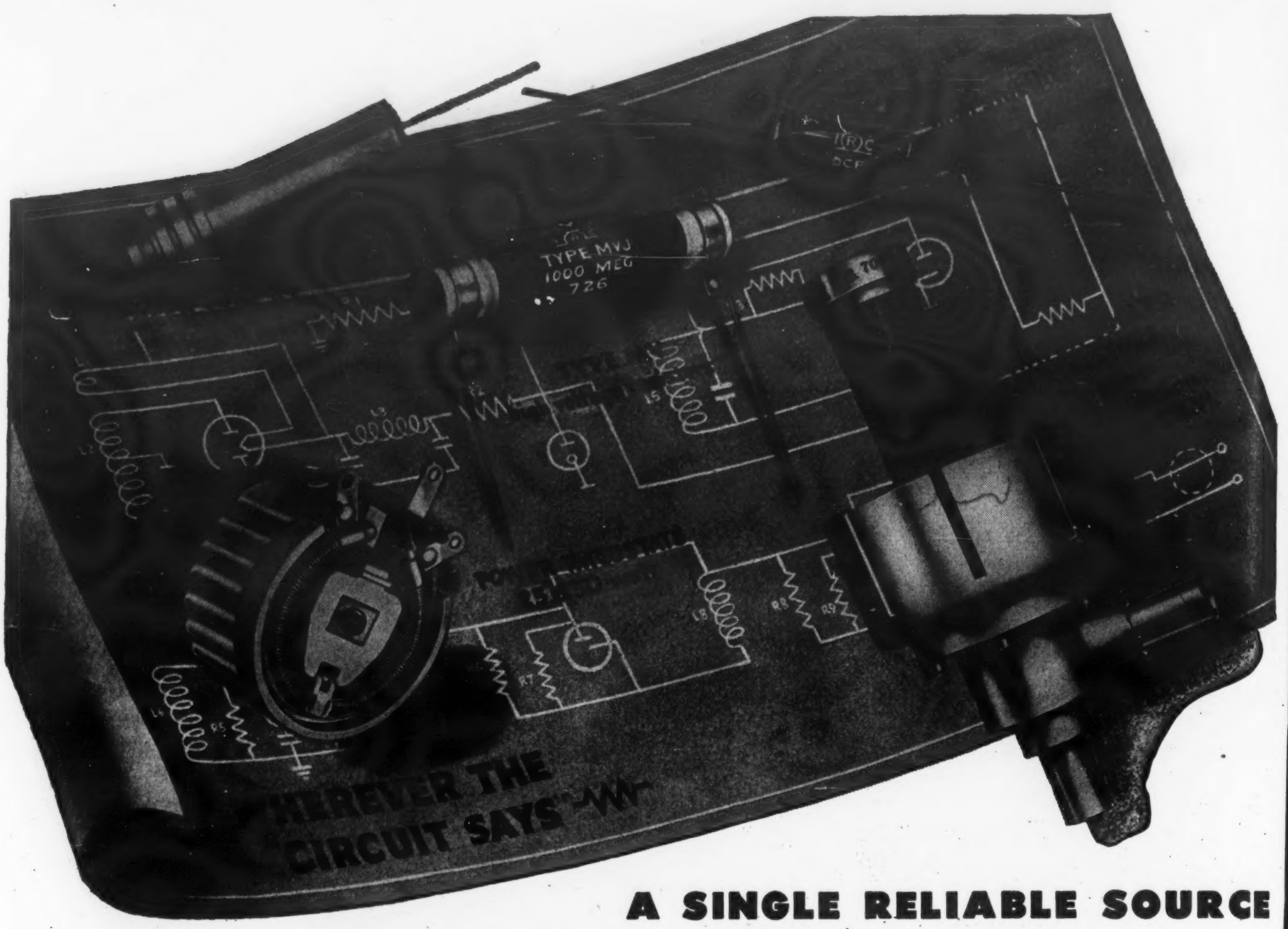

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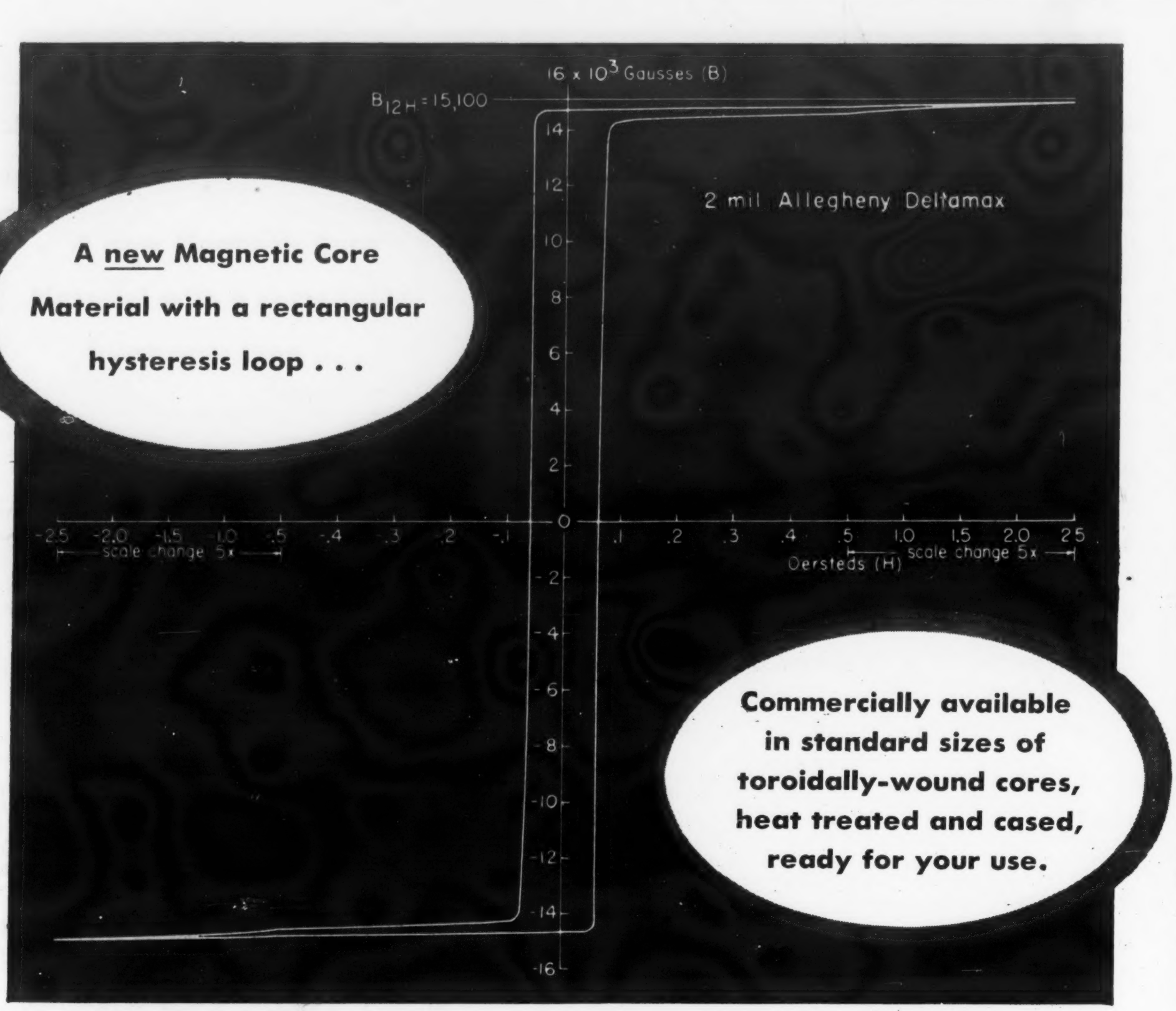

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RADAR IN ETO AIR-GROUND OPERATIONS

By Colonel E. Blair Garland

COLONEL E. BLAIR GARLAND

Graduated from USMA in 1927, received MS and EE degrees from Yale University in 1928, and served with the Signal Corps and Air Corps until he went to the European theater in July 1942. Under General E. R. Quesada of the IXth Tactical Air Command, he had charge of the use of radar units during the invasion of France. Here he tells the story of the 555th, 563d, 566th, 573d, 718th and 719th Aircraft Warning units and others during those stirring days when ground and air forces teamed so efficiently to defeat the Germans.

As the key to the success of all tactical air operations is the effective flight control of fighter aircraft in one form or another it was the evolution of such a control system that loomed as the major task facing the tactical air forces in Europe in World War II. Here for the first time an attempt was being made to use a complete aircraft warning and fighter control network as an integral part of a tactical air force working in close cooperation with ground forces.

The primary requisite of such a system was the immediate knowledge of its own aircraft as well as that of the enemy. With little or no existing precedent the whole had to be molded from a heterogeneous welter of personnel originally trained for purely defensive operations and whatever equipment could be made available. As it turned out, the radar sets were mostly British with a sprinkling of American. As to the mode of operation there was still less of a precedential nature.

Any story of radar in air-ground operations in Europe must go back to the winter 1942-1943 and the Eighth Air Force in England. At that time a board of officers headed by General Follett Bradley, Inspector General of USAAF (not Gen. Omar Bradley), came to the European Theater primarily to determine the Air Force personnel requirements for the strategic air force and secondarily the personnel requirements for a tactical air force. The tactical air force would be the one to cooperate with the American ground forces when they opened a second front by invading the continent.

The signal section of the Eighth Air Force was working on plans for the procurement and installation of the British H_2S[1] airborne radar in American Pathfinder airplanes and on the training of air crews for these airplanes in an effort to defeat the notoriously bad European weather. It was therefore natural that Gen. Bradley turned to this section for help in establishing the personnel requirements for radar and communications personnel for such a tactical air force.

It must be borne in mind that very few people at the time had any real conception of what the radar organization of a tactical air force should look like or what its capabilities and limitations might be. The USAAF had had no combat experience with tactical radar units in the field while the RAF had had some slight battle experience with such a unit in Africa.

Exact information as to the composition of the ground forces and in what numbers would make the assault on the fortress of Europe was also extremely hard to pin down, which further hampered the planners. The estimate indicated that there would be two American armies covering a front of 150 miles. Why a 150 mile army front was suggested and used by the Americans in planning has always been a mystery although in reality it was fortunate in that it did insure that sufficient personnel and equipment were made available. The British on the other hand based their plans on an army front of 50 miles, exactly the total initial front established which was more realistic in view of the range of the radar sets available to them. However, what was most important was the official acceptance of a plan. Whether or not it changed the next day would in no way detract from it.

The initial organization proposed for an army front was designated an air defense wing simply for lack of a better title. The wing (Chart 1) included an operations section and

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[1]Code name for British blind bombing radar set later replaced by American H_2X radar set (APS-15).

Controllers and plotters grouped around plotting board, IX Tactical Air Command Fighter Control Center, Verviers, Belgium. Joint TAC-Army operations room may be seen through rear window.

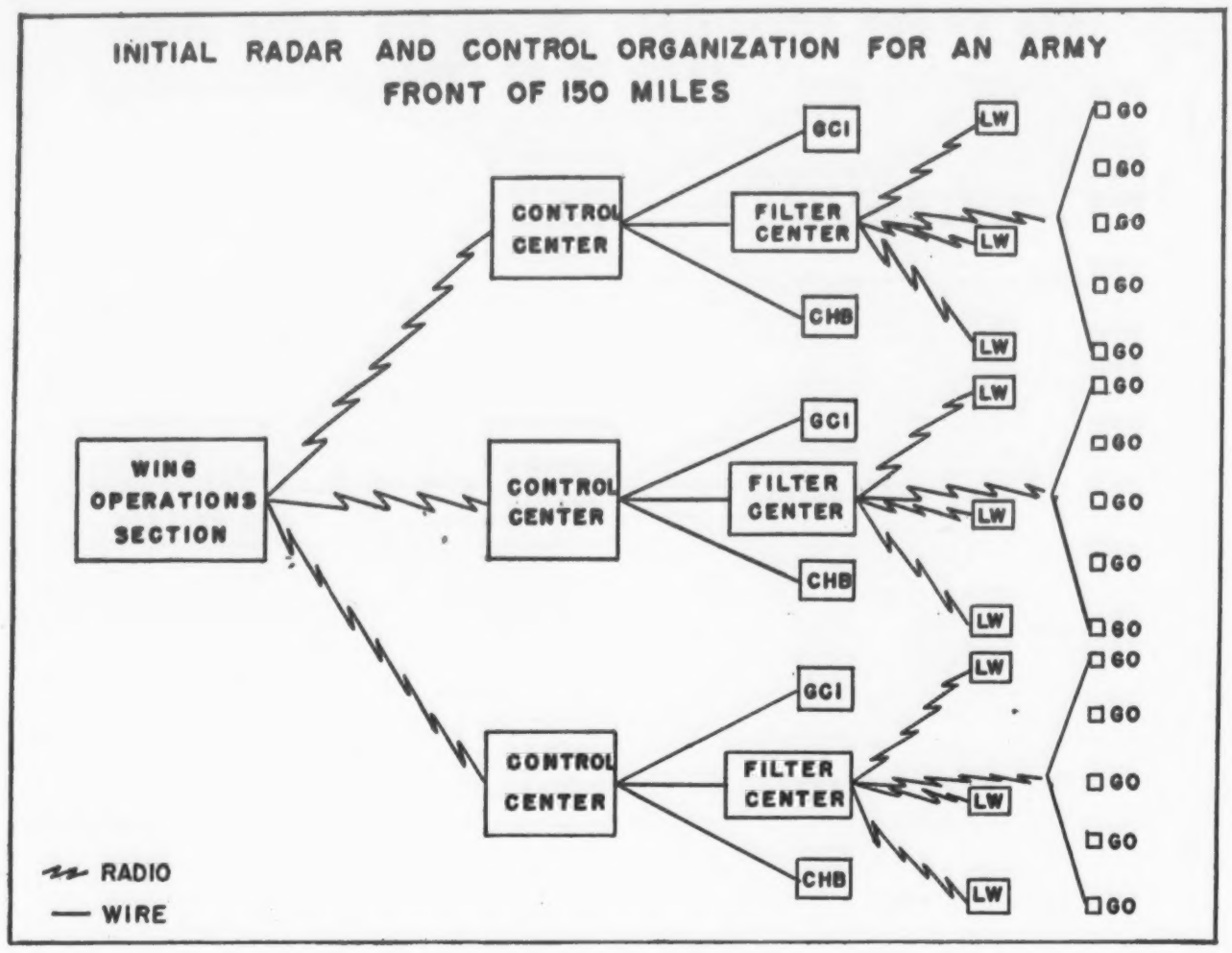

Chart 1.

three control centers each with a filter center similar to the familiar sector plan for a fixed installation. Each filter center had five G.O.[2] posts and a maximum of three L. W.[3] radar sets reporting into it. Each control center had a GCI[4] radar set and a CHB[5] radar set reporting directly to it. Such a scheme was not difficult to trace back to the elaborate fixed British home air defense system and would obviously have been as unwieldy as it was complex.

Inquiry was made on the United States as to the availability of mobile radar equipment of such ruggedness as to be suitable for a ground radar organization in a moving situation. Word came back that no equipment of the type required was available. By now it was summer of 1943 and the Signal Officer, cognizant of the fact that an ultimate invasion would take place and that it might be soon, decided immediate action was necessary. Time could not be wasted waiting for new equipment to be developed and manufactured in the States.

The British, from their limited air-ground combat experience in the African desert, had done considerable experimenting with mobile type radar and with various types of organizations to operate them. In fact they had by this time settled on an organization (RAF 83 and 84 groups) and on the types of radar sets to be used with the organizations and were in the process of manufacturing them in quantity. Arrangements were made through the Air Ministry to see the finished sets in action.

British Sets Procured

The sight of RAF 83 Group actually conducting intensive commando type training in the field in preparation for the invasion while the Americans were still making plans on paper caused no little concern. Although the sets appeared to require an overwhelming number of vehicles for operation and were subject to jamming because of their low frequency, it was decided that they would fill the immediate requirement. Since the British could produce sufficient sets by December 1943 for both the Americans and themselves an order was placed for enough sets to equip five of the paper aircraft warning units. This decision on the part of the Signal Officer seems questionable based on hind sight. It must be remembered, however, that the commander and the staff of the Eighth Air Force at the time were completely engrossed in their own plans for the immediate strategic situation. They could hardly be impressed by the future requirements of an unknown tactical air force for a land action that might or might not take place at some indefinite date.

With the radar equipment arranged for, radar and communications personnel based on the Bradley board report was ordered from the States. This included signal battalions, air support command; signal construction battalions, heavy; fighter control squadrons, tactical air communication squadrons, aircraft warning battalions and wing signal companies sufficient for two tactical air forces of five fighter wings. At the same time communications equipment to tie these organizations into workable control systems was requisitioned. It was not a small undertaking.

The MEW

One other incident that was to have considerable bearing on future radar operations on the continent was the arrival in England of the American radar set familiarly known as the MEW.[6] This set recently arrived from the States had been obtained by the Eighth Air Force at the request of the RAF for use on an experimental basis in directing and controlling long range fighter sweeps from the south coast of England. It had been installed in an advantageous spot on the coast overlooking the English Channel and the coast of France and both Americans and British shared in controlling missions and sweeps from it.

Among the senior controllers was Capt. Edwin Andrus, an American electronics group officer who had had considerable success while with the British in experimenting in the controlling and directing of day fighters by means of long range radar. His was to be an important role in the future development of the radar organizations used by the Americans.

The MEW set, weighing 66 tons, was installed in permanent buildings at Start Point, Devon, England, and amazed those responsible for it by its fine definition and extreme long range. It gained immediate publicity by a thrilling episode in which it picked up 14 Fortresses flying out over the Atlantic on their return from a mission over Germany. Due to faulty navigation they thought they

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[2]Ground Observer. An individual who reported aircraft from visual observation.

[3]Light Warning. Small light weight radar set.

[4]Ground Control Intercept. A radar set used for control of interception of enemy aircraft by friendly aircraft.

[5]Chain Home Beam. A radar set used for reporting only.

[6]Microwave early warning. AN/CPS-1 operating on 3000 mcs. with a range of 200-250 miles on a bomber formation at 30,000 ft.

were leaving the coast of Belgium when actually they were leaving the Brest peninsula. As their fuel was low and they failed to see the coastlist of England the leader gave the order to ditch and radioed to that effect. At the moment the MEW picked them up on its scope 170 miles away. By quickly identifying them by D/F radio the controller talked all 14 of the planes back to England. Although several had engines out and several were on fire they all touched down safely.

As the aircraft warning units arrived from the States they were quartered in the field in tents and preparations made to initiate them into the intricacies of the British radar sets they were going to use in combat on the continent. With the increased influx of personnel, one unit after another was sent to the very fine British radar training center at Renscombe Downs. Here they received their sets and equipment and went into the field to operate as small separate units rather than in any organized reporting and control scheme.

The organization of each battalion as it completed its training varied but slightly depending on whether it was intended for the role of operating with the tactical air commands or in the role of air defense of the rear areas. Each battalion took its place in the field with its fighter wing and its associated fighter control squadron.[7] Constant field exercises involving sudden moves without advance notice were held to test mobility and improve operations.

[7]The unit which maintained and operated the air-ground radio channels and the radio direction finding system.

Plotting board at FDP where maximum filtering possible was accomplished.

First Action

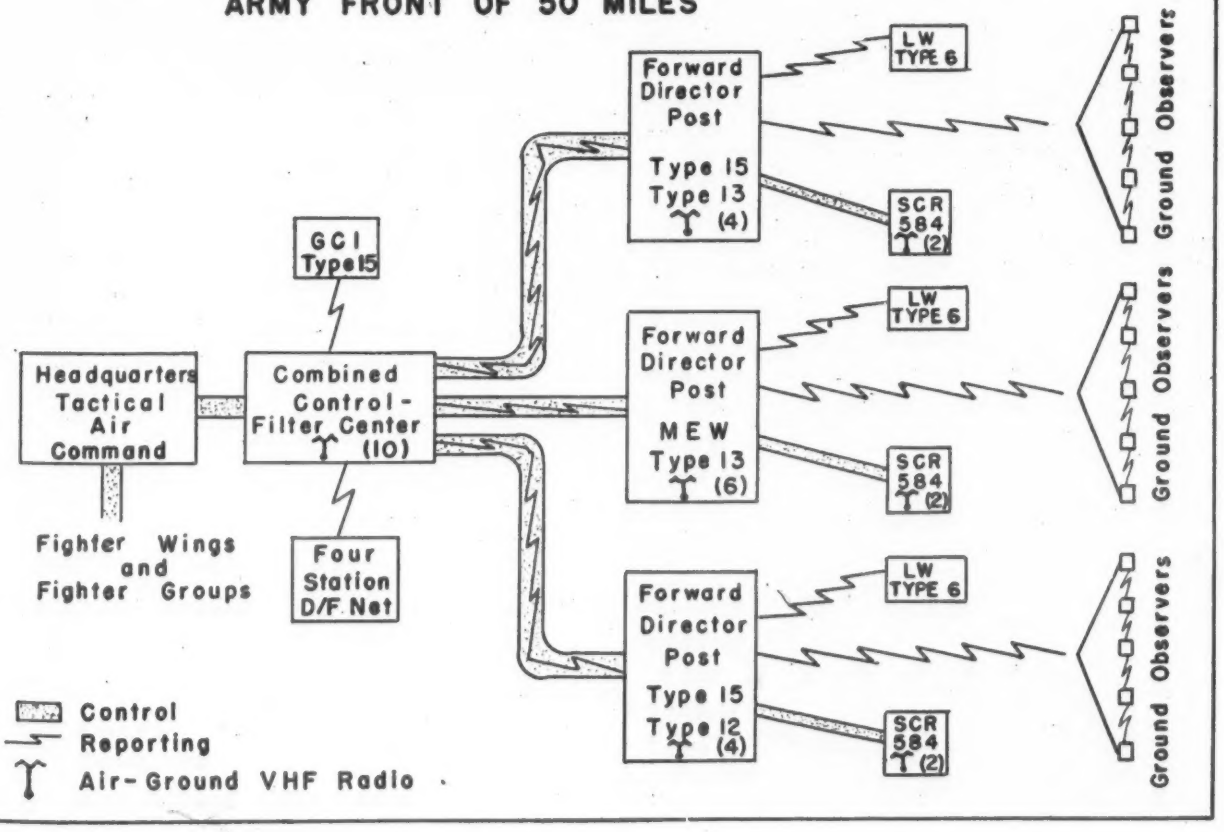
The 555th Signal Aircraft Warning Battalion and the 327th Fighter Control Squadron were assigned to the 70th Fighter Wing. They were immediately deployed in the area about Colchester and were the first to receive their baptism of fire when German planes made a night air raid on the town. There they began to operate as an integrated control and warning unit of the 70th Wing's fighters who were assisting the Eighth Air Force as escort and flying independent fighter sweeps in training for the invasion. Their point-to-point and air-ground radio equipment had not yet arrived and it appeared, among other disappointments, that keyed radio would be used for reporting. This bit of gloom was shortly dispelled by the arrival of fine new VHF FM[8] 30-40 and 70-100 mcs. voice radio equipment from the States.

Control Improves

From here on until "D" Day constant improvements and revisions were made in the organization and operating procedures of the radar battalions and their equipment was mobilized to the maximum extent possible in trucks and trailers. By now the initial complex control organization had been simplified so that each fighter wing had a combined control-filter center with VHF air-ground channels, (Chart II) a four-station VHF fixer net and a type 15[9] radar set for early warning and GCI control. Reporting to the center were three forward director posts each consisting of a miniature

Chart 2.

TYPICAL CONTROL AND WARNING ORGANIZATION AS DEVELOPED IN COMBAT IN EUROPE FOR AN ARMY FRONT OF 50 MILES



[8]Very high frequency frequency-modulated radio which is less susceptible to disturbance from static and noise than ordinary amplitude-modulated radio.

[9]British set operating on 209 mcs. with a range of approximately 90-100 miles.

combined control-filter center with its VHF air-ground channels, a type 15 and type 14[10] early warning radar set and a type 13[11] radar set for height finding. A ground observer net of five observer posts and a type 6[12] light warning radar set reported to each forward director post. The L.W. set was intended to cover any blind spots suffered by the FDP due to rough terrain.

British High Chassis

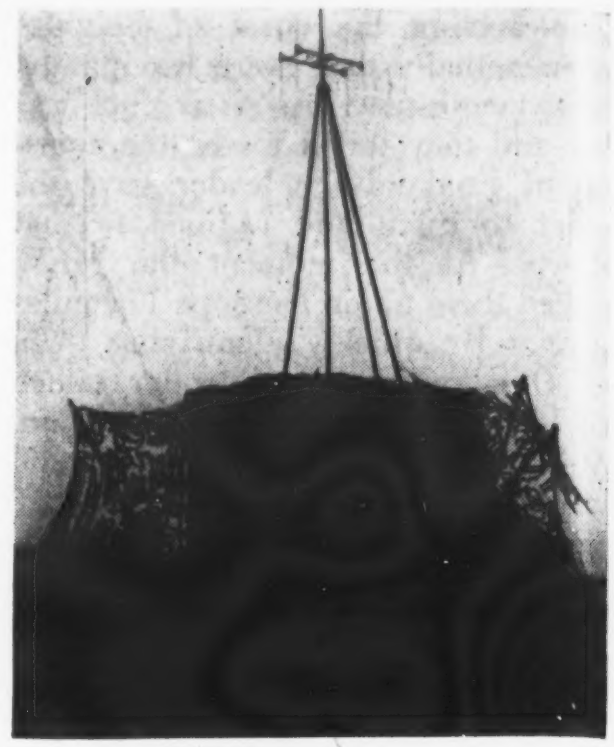
The British radar vehicles with their high chassis and lack of four-wheel drives struck a sour note with the Americans who took for granted the utility of American trucks. A landing exercise simulating the actual landing of vehicles on the beaches in Normandy was carried out in April. The Signal Officer, with members of the aircraft warning battalions attended the practice landing and when the few radar vehicles in the test stalled in the surf and were left to the mercy of the rising tide (a passing American standard six-by-six truck with winch finally pulled them out) a decision was made that every radar vehicle participating in the invasion must have its British chassis replaced by an American standard six-by-six or cab-over-engine type chassis. With great energy, aided by the closeness of D-Day, and the all out backing of the commanding general an enterprising ordnance company performed this unbelievable task in a matter of days.

Still another haunting fear brought about a last minute change in plans. The constant nightmare that the Germans might jam the low frequency British radar sets coupled with the phenomenal success of the MEW fixed radar station at Start Point caused the planners and the commander to pause a moment and consider. A second MEW set had just arrived in England and was being set up for testing. The operating characteristics of these sets far exceeded that of any known set at the time but the great question was—could sixty-six tons of delicate technical equipment be mobilized sufficiently to take part in an invasion and remain operable throughout the continuing campaign? The antenna itself weighed six tons and was engineered for mounting on a concrete base. How could it possibly be hauled across a beach and then through Europe?

A hasty trial was held in which several expert linemen of a signal construction battalion laid down a temporary base of twelve by twelve timbers in place of concrete. The little time consumed in placing the base and raising the antenna and the steadiness of the base were so impressive that it was decided it could be done. Orders were given at once to mobilize the second MEW set in 2½ ton, 6 by 6 Ordnance M-7 type trucks and a new combat loading plan was approved by the Army for placing it on the landing craft in place of one of the 555th's type 15 sets. Work began on April 15th after much scurrying for equipment by British Branch Radiation Lab[13] which had accepted in its stride this last minute job and eleven days later the MEW was on wheels ready to roll.

Time was short for anything more than a cursory trial on the south coast near Exeter but indications pointed to tremendous possibilities. The operations room, the control room, the test and maintenance equipment, power and communications facilities and the antenna were installed or carried in five M-7 type vans and five standard 2½ ton trucks.

Although this was an amazing step forward it was a far cry from the elaborate field installation which included Jamesway shelters that the MEW was to grow into as it attained new heights in controlling aircraft on the continent. The third set which arrived in England shortly afterward was speedily mobilized by BBRL.



MEW antenna mounted on a trailer chassis for rapid transportation.

As D-Day approached, more and more simulated landing exercises such as Duck, Tiger and Beaver were held by the Army. Landing on the wrong beach, arrival at the wrong time, and the fact that many of the radar vehicles with their unwieldy antennae could not board the landing craft for which they were scheduled, all pointed toward the care and detail that had to be put into such operations and gave those involved many headaches along with much needed experience.

Meanwhile Neptune, the implementing plan for the real thing, was taking form. Unit commanders were brought in, cleared for top-secret, and briefed on their exact role in the detailed plan. Aerial photographs were studied and a model of the beachhead was constructed to show the contour of the ground behind the beaches to assist in the selection of the initial radar sites and to indicate the nearest exits from the beach.

The plan briefly was this: the fixed radar screen on the south and southeast coast of England would do the reporting, controlling and vectoring of fighter aircraft during the assault phase assisted by radar sets mounted on fighter direction ships just off the hostile shore. The first control and radar equipment ashore in the American sector would be a GCI set from RAF 85 Group, since they were charged with the air defense of the beachhead and were to remain there in an air defense role as the battle moved forward. American control-

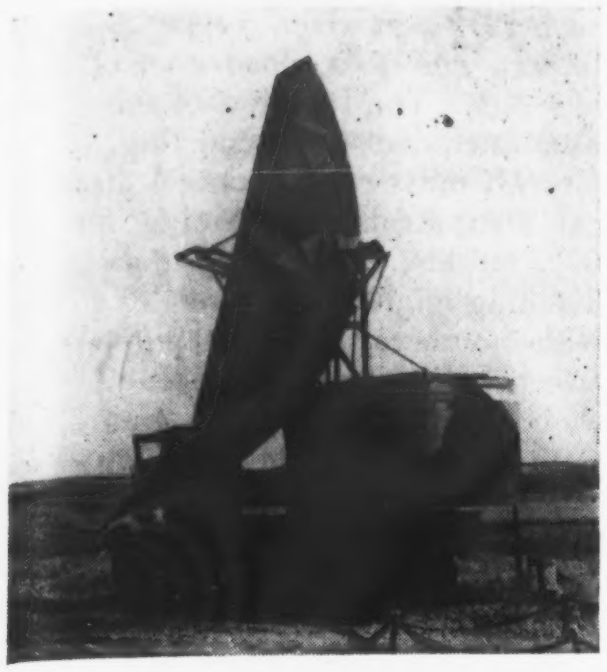
[10]British set operating on 600 mcs. with a fairly narrow beam. Approximate range 100 miles.

[11]British set operating on 3000 mcs. with a narrow vertical beam for reading accurate elevations. Approximate range 60-70 miles.

[12]British set operating on 212 mcs. with a range of 40-50 miles.

[13]A branch of Radiation Laboratory at M.I.T. which built the first MEW sets.

Controller briefing himself on the latest ground situation and bomb line prior to going on duty.



Type 13 height finding radar. Note American cab-over-engine chassis.

lers were assigned to control American aircraft flying over the beachhead. Two light warning sets of the 555th were to follow the British ashore to act as early warning for the GCI fighter control set, followed immediately by the 70th Fighter Wing components. As soon as the 70th Wing had its control center set up on the beachhead the fighter direction ships would pass control to it. This plan needless to say required the most minute detailing so that the proper echelons would be put ashore in the proper order to insure a balanced buildup of radar and control equipment and communications and radar operating personnel to do the task at hand.

On Omaha Beach

The story of what actually happened is of interest. The radar vehicles and men of the first echelon arrived off Omaha beach at approximately five o'clock in the afternoon of D-Day to find the beach, in what was a shambles of dead and wounded assault troops and blasted equipment, not yet entirely cleared of obstacles and the enemy. The tides had run so strong earlier in the day that the 16th Infantry's regimental combat team had landed east of their beach, Easy Red covering exit E-1, and after heavy losses and hard fighting were still in the process of clearing the beach of German defenses.

The radar teams were caught in a stream of ground units too late to turn back. The radar vehicles were landed in the sand amid a continuous fire from mortars, machine guns and small arms. Many of the men and officers were badly wounded including the wing commander in charge and many of the vehicles were hit so badly that they were permanently out of commission. The unwieldy vehicles by dint of great heroism and leadership on the part of several of the officers and men including those Americans present were finally driven off the beach and up a draw to the east of the village of St. Laurent Sur Mer where they were out of the immediate gunfire.

Early the following day the light warning sets were on the air reporting aircraft. By D+2 the commanding officer of the 70th Fighter Wing arrived with the first increment of the fighter control center. They at once moved into Griqueville and assumed control of aircraft from the fighter direction ship off Omaha beach. Simultaneously, the first elements of Headquarters IXth Tactical Air Command and the Headquarters of the First Army landed and set up[14] near Grand Camp. The Air Force was ashore. Gradually the remaining elements of the Wing and the IXth TAC and the fighter groups themselves came ashore. Many of them were so close to the front that at various times they were under fire by German troops and artillery.

The 84th Fighter Wing followed by the 100th Wing landed over the Utah beach and took their positions in the Cherbourg peninsula to assume control of their fighter-bombers. By D+6 the MEW was ashore and in four more days was on the air controlling the first of the thousands of missions it was to control. As the ground troops fought their way slowly through the hedgerows and the Allied landing became a certainty, control of American aircraft was taken over completely by the units in Normandy. The radar sets themselves edged forward as fast as the front permitted and were of tremendous value in assisting the fighters in support of the ground troops. No longer were they training for the battle to come—they were now in it and playing for keeps.

[14]The close liaison necessary between a tactical air command headquarters and an army headquarters requires the two headquarters be established in close physical proximity of each other.

Plotters behind vertical plotting-board tracking aircraft. Writing is done backwards to be correct when viewed from front.

Radar Screen Moves Forward

It is well to pause here and review what has gone before in order to examine the method by which the air cooperated with the ground through the use of radar and the communications available. As far as the radar itself was concerned it had developed through various stages from the fixed chain home beam stations surrounding the British Isles to the mobile type 15 early warning sets, to the addition at the last moment of the American MEW. During the preinvasion period all warning and control functions were performed from the combined British-American control center at Uxbridge just outside of London and from the sectors such as Tangmere, Middle Wallop and Biggin Hill. During the assault phase the fighter direction ships laying off Normandy beach had acted as forward direction posts and had assumed control of the aircraft over the invasion area. Then as the first radar sets became operational ashore the radar screen was pushed forward and gradually severed from the rear tie to become a separate warning and control scheme. So much for the radar. How did it fit into the tactical air force plan of operation?

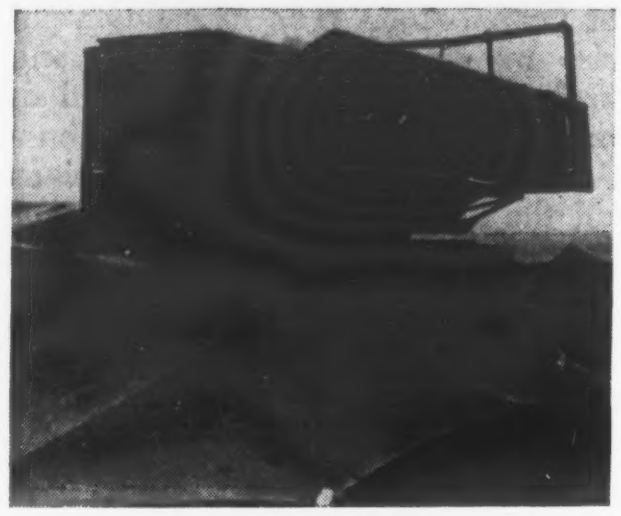
The initial plan of operation had its origin as far back as November 1943. It had developed during the following months as equipment and facilities were improvised or became available from the States and did not change materially during the campaign in Europe. It was visualized that requests for air support would originate at division and corps level through air liaison officers acting as air advisors to the commanders at each level. These requests would be transmitted by radio direct to the Tactical Air Command—Army Joint Operations Center where the G-3 (Air) of the Army and the A-3 of the Tactical Air Command would approve or disapprove them. If approved, the A-3 passed them on to the fighter wing for execution by its

fighter-bomber groups. The wing control center was delegated the task of controlling and directing the mission as soon as it became airborne and of assisting it in the location of its target by means of radar and radio D/F equipment. In addition, it had the responsibility of warning of enemy aircraft and of controlling interceptions of enemy aircraft both day and night.

This basic plan did not change. Its spectacular success in support of the ground armies was the criteria. Each of the tactical air commands operated in general following this plan though many variations and refinements occurred as the battle situation demanded. For example, following the breakout of the First Army at St. Lo, the rapid advance to the Seine River and the continuing drive into Belgium the control elements of the 70th Fighter Wing were taken over by IX Tactical Air Command Headquarters. The wing continued to retain command of the fighter-bomber groups and became in effect the communications switching central of the Tactical Air Command.

Long Range Radar Control

Returning for a moment to the 555th Signal Aircraft Warning Battalion as a typical battalion it is interesting to trace its progress across the continent after the breakout in the beachhead. The two type 15 FDP's had come ashore and quickly gone into action. The sites had already been selected by ORS (Operational Research Section composed of civilian scientific experts) personnel from studies made of aerial photographs and maps of the terrain. Such individuals as Mr. Arnold C. McLean, Mr. Roland W. Larson and other personnel, under the direction of Mr. Carroll L. Zimmerman performed little publicized but highly valuable work. The MEW arrived at its first site four miles east of Isigny on D+7 and four days later introduced Allied pilots to long range radar control. Though a bit skeptical at first, the pilots soon found themselves being led to their targets as far as 75 to 100 miles away and were readily convinced that this was something not only desirable but necessary. The popularity of control by radar was at last established and from then on the pilot could be certain that no matter where he was or where his target was they could be brought together by this control agency. As the ground situation progressed so did the experience of the fighter-bombers and their ground control.



Antenna of type 14 radar set.

It soon became evident that the fighter control center which was operating under the wing could be more efficiently operated under the command. As the ground forces moved forward the TAC-ARMY headquarters moved directly behind the corps. The fighter-bomber groups on the other hand could not move as rapidly since it took time to prepare their strips and runways for them. This meant that the wing headquarters and its radar unit moved forward in order to look as far out as possible over the front lines and in doing so the communication lines between the wing and its groups were extended beyond control. It was therefore decided that the radar and control units would be assigned to the command headquarters thus requiring communications only from the headquarters directly forward to the radar units. The wing would be located strategically in the center of the cluster of airdromes requiring fairly short communication lines to the groups. The wing and the command could then be tied together by a single axis. This considerable saving in the communications requirement, and the fact that the very closest cooperation and liaison in planning between the TAC and Army was necessary, clinched the decision.

Forward Post Expansion

Greater emphasis was placed on the forward director posts and each was given additional equipment to carry out its increased functions of control. The MEW whose FDP had become the most important of the three FDP's expanded its operation room into a 24′ x 24′ Jamesway shelter and its vertical plotting board was enlarged to 8′ x 10′. More controllers were added to each FDP, more VHF air-ground channels were made available, the number of landline circuits was increased to include teletype for transmitting the daily field order and each FDP was given a type 13 height finders and two close control SCR 584 sets. The function of the FDP's now included the reporting of all aircraft movements, control of all local air patrols, positioning aircraft over targets, vectoring fighters home, assisting fighters in rendezvousing with bombers, directing fighters on sweeps after they had accomplished their dive bomb missions, controlling both day and night reconnaissance missions and lastly the controlling of night fighters in intercepting enemy aircraft and in night intruder work.

SCR 584's Effectiveness

The SCR 584 set mentioned above came on the radar scene in July 1944, while St. Lo was still in the hands of the Germans. An operating crew had been trained on this American precision radar at Middle Wallop under the auspices of BBRL. The set originally designed for anti-aircraft gun laying was a micro wave radar which was used in precision controlling of aircraft. Its unusual feature was that once it picked up an aircraft its beam could lock onto it and track it automatically. It has a plotting board with a 1:100,000 scale map under which a tiny spot of light represented at any instant the exact position of the aircraft over the terrain. The movement of the aircraft was exactly followed by the movement of the spot of light on the map. By watching the spot of light and giving directions to the pilot by voice radio the controller could direct the spot of light and simultaneously the aircraft to its exact target.

The initial results were so extremely gratifying that additional sets were remodelled at once for the battalions of the other tactical air commands. These close control radars came to play a decisive role in the radar screen. Located from four to ten miles behind the front they controlled fighter bombers to their targets, provided aid to navigation to lost pilots, controlled blind bombing through the overcast, controlled night fighters on night bombing missions and aided reconnaissance planes in photographing large areas. An interesting story typical of the experiences of the 584's is that of a flight of fighter-bombers that knocked out a beautifully camouflaged German gun battery. This particular gun battery was firing on some American tanks with devastating effect. It was finally located by sound detectors and its position was sent to the fighter

control center with a request that it be destroyed. A flight of fighter-bombers was vectored to the vicinity of the battery by the MEW but the weather was so bad that it was turned over to the 584 for closer control. The pilots after several passes over the area could not find the well-concealed battery. Finally, as they were about to leave, one of the guns fired and the flash was seen by the flight leader. The flight immediately dived on the battery and quickly destroyed it to receive the hearty thanks of the tank commander and his tankers.

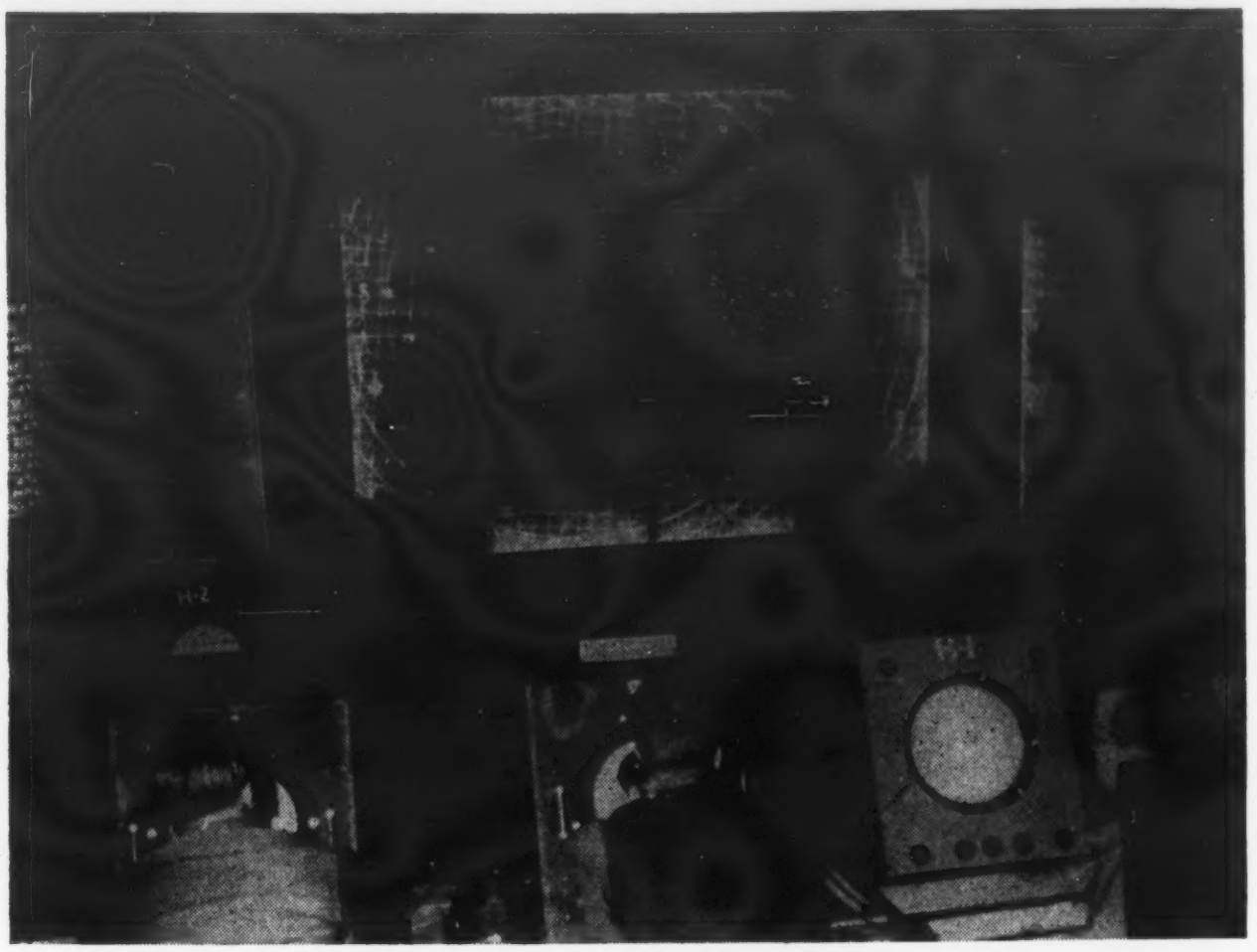
Withdrawal in the Bulge

Many other spectacular stories could be told of radar operations as the battle progressed forward, became stationary, and then with the battle of the Bulge made a complete about face. No particular unit accomplished any more outstanding feats than any other. They all faced hardships, heavy work and even death in accomplishing their mission.

One story of interest includes the 555th during General von Rundstedt's great counter offensive in December 1944. The 555th had its FDP's with their 584 sets deployed on a generally north-south line Aachen, Malmedy, St. Vith and Bastogne directly in the path of the German drive. 9th Tactical Air Command Headquarters with its fighter control center was occupying the Palais du Justice building in Verviers, Belgium, with a view to remaining there for the winter.

The ground forces had decided because of a shortage of supplies not to start a new offensive until the spring of 1945. The 70th Wing was at Liege and had its groups deployed in the area Charleroi-Liege. The MEW which had been destroyed in late November by a fire caused by an exploding gasoline stove had been restored to its original state by new equipment hurriedly flown from the States.

Then on the fateful morning of December 16th word filtered back that the Germans were on the move and in sufficient number to prove that it was an all out attack. There is no need to repeat what happened on the ground as far as the courageous American doughboys are concerned. As soon as the attack began to firm up orders were given by the air operations officer to withdraw all radar equipment to the west of the Meuse river. In spite of heroic action under small arms fire by the crew of



Vertical plotting board of MEW and remoted height finder scopes H-1 and H-2.

the FDP at St. Vith two radar sets were lost and three men were taken prisoner. No one will deny but for their unselfish perseverence under conditions of ice, snow and mud much more equipment would have been lost to the enemy. The MEW which was sited near Eupen held its position until a German paratrooper captain was killed by a crew member as he was about to attempt the destruction of the set with TNT charges.

Radar Control's Record

A new ground line was established generally east-west from Aachen, Liege, Namur, Charleroi, which shifted the radar screen from looking east to looking south over the right side of the German spearhead and covering the First Army's area. After the paratrooper incident the MEW moved into a new position just north of Liege and was on the air again within forty-eight hours controlling fighter bombers under most difficult weather conditions. The planes played a major part in stopping the German advance by bombing and strafing the tank and motorized columns on the ground. The MEW in its new location was constantly harassed by buzz bombs as it was unfortunately in a direct line of the buzz bombs intended for Antwerp and Brussels.

In spite of this, the record shows that for December the MEW controlled fighter bombers that destroyed 161 German aircraft and damaged 72 with 11 probables. On one outstanding day a controller was credited with 12 kills and 11 damaged. As soon as the ground battle situation improved the radar sets were back again on the offensive following the First Army front as it moved across the Rhine and deep into Germany. By this time German aircraft were a rarity and the air battle became one of exploitation. The final days of the war found the IX Tactical Air Command Headquarters at Weimar, the seat of the onetime German Republic and presently the site of the notorious Buchenwald concentration camp.

The use of radar in mobile air-ground operations came into its own in the battle of Europe. It began more as a reporting facility but like a flash it became an indispensible part of tactical air operations. The art of controlling tactical air missions was learned the hard way—in actual combat. Today that art is being perpetuated by the Tactical Air Command. The signal aircraft warning battalion and the fighter control squadron have been integrated into a single, streamlined, efficient organization which performs the duties of the old organizations with greater ease and smoothness. The new organization is officially designated a Tactical Air Control Group, T/O and E 1-600 and is fully described in W. D. Field Manual, FM 31-35, "Air-Ground Operations."

EDITORIAL

Since the days when a spiral of smoke or the reverberations of a hammered hollow log were considered the last word in communications equipment, the communications man has been a specialist, a man apart, whose craft was understood only by a tight little guild of fellow workers. The outsider recognized that a telegraph key, expertly operated, and complemented on the receiving end by another operator with the necessary knowledge, would relay his thoughts rapidly and accurately from point to point. The uninitiated came to take this passage of thought as a matter of course and seldom learned or probed the mysteries of the profession.

With the development of electronic communications devices, the degree of specialization has grown in almost direct ratio to the increase in the complexity of the medium of communication. Whereas the early telegraph was actually a relatively simple instrument to master, install, or maintain, the communications devices in use today have acquired more and more components, requiring more and more specialists, each with a higher, but narrower area of knowledge.

If the telegraph was something of a mystery to the layman, the operation of radar, Loran, Shoran, and present day cryptographic sections must seem to border on the occult, which indeed it does. And in the general category of laymen as concerns the techniques of communication, it is necessary to include most officers of any of the armed services, not on signal duties.

This is, of course, no reflection on the talents or training of any officer. It is simply inescapable that most operations officers, from pilots to air force commanders, must make use of today's communications devices at every turn, safe in the knowledge inherited from the early patron of the telegraph, that the specialists will get the word through, and accepting their skills at their incalculable high value.

In every military organization there exists this vital need for the adroit utilization of communications and quite as important—the need for a clearly defined understanding as to where the control of such utilization rests.

Within the framework of the U. S. Air Force, it has been established, through the long—and sometimes bitter—experience of the war years, that communications will be an integral and inseparable part of operations. This does not imply that the key practitioner of the exact and complex science of communications will be under the rigid control of a staff officer whose primary concern is operations. It does imply, however that in the execution of the primary mission of the Air Force—maximum exploitation of the combat and transport capabilities of the airplane—establishment of the requisite communications system must be at the highest possible command level to effect control of any given situation.

It is the concept of the U. S. Air Force that any system of communications management must be geared to give impetus to the basic mission and must be so machined as to mesh smoothly with every phase and factor in an overall air operation.

This concept of communications employment is apparent in the organization of Headquarters, U. S. Air Force, wherein the Director of Communications is under the supervision of the Deputy Chief of Staff, Operations. As a Director, he is placed on an operational level co-equal with Training and Requirements, Intelligence, and Plans and Operations. Thus it is possible to obtain true communications management, inasmuch as the Director has been delegated the necessary authority to permit direct control and coordination of technical matters, and to plan and operate in such fashion as to integrate communications with the Air Force as a whole.

The global nature of the U. S. Air Force indicates the need for a communications complex spanning the entire world, a military network adept not only in the relay of information but an organization skilled in communications security, radio intelligence, and special techniques to assure that a commander will not only know if his message got through but will also be aware if it got through to the enemy. It operates to inform, to achieve surprise and to prevent surprise.

The extent to which the Air Force has been successful in establishing communications systems to meet its present requirements has been sharply underscored by the success of the Berlin airlift—Operations Vittles.

The use of three full crews in each transport aircraft enabled us to raise the utilization factor to a point when some planes were flying the corridors 14 hours out of a possible 24, but it was the expansion and development of communications, honed to razor keeness, which made possible the split-second accuracy of the supply runs, through weather which was often nearly impenetrable.

The statistics covering the number of full instrument Ground Controlled Approaches made at Tempelhof during the last quarter of 1948 tell a graphic story. In those three months, the communications men of the Air Force brought 7,396 planes safely to earth in Berlin under less than minimum conditions of ceiling and visability—representing approximately 73,960 tons of cargo which, save for GCA, would have been flown back to its base or origin.

It was at Tempelhof that the Air Force perfected the use of GCA, the electronic device which permits two or more aircraft to be held simultaneously and talked down in turn on the final approach, in some cases at less than three minute intervals. The successful operation of this landing aid was made possible through an intricate system of communications of which the GCA represented but one segment.

Throughout Germany, the upturn in communications traffic during 1948 was vast. In June of 1948, the month in which Operation Vittles began, there were five GCA units operational in the entire occupied area. Aided by these, the U. S. Air Force completed 531 instrument landings, including simulated GCA approaches. There were, in the same month, 11,000 air traffic radio contacts and 9,442 ground-to-air voice contacts.

Compare, then, with the single month of December 1948. With ten GCA units, 7,200 instrument landings were successfully completed. More than 34,000 air traffic contacts were made and the ground-to-air voice contact numbered 25,647.

That this tremendous emergency load was shouldered with a minimum of personnel and material failure bespeaks the quality of the men and machines of the Air Force communications units.

In the long view, perhaps the greatest satisfaction which we have derived communications-wise from the success of the Berlin airlift has been the vindication of our long-term thinking. This operation, which has proved to be the best post-war test of the U. S. Air Force concept of communication, has proven that our ideas were sound. The freedom from interference by bad weather, the precise timing, and the tight traffic control required by Vittles would have been impossible except for the application of modern communications and electronic techniques.

We are looking forward to considerable improvement in our communications systems in the future. In this field, as in many others, the U. S. Air Force is feeling its way slowly in its new status as a separate department of the National Military Establishment. We anticipate, however, that we shall produce a system of communications which will not only be an efficient entity but will be so conceived and designed to fit the particular needs of the Air Force that it will permit us to provide the American people with the most effective Air Force in the world, served by the most efficient communications network yet devised.

General Hoyt S. Vandenberg, USAF
Chief of Staff, U. S. Air Force

Photos

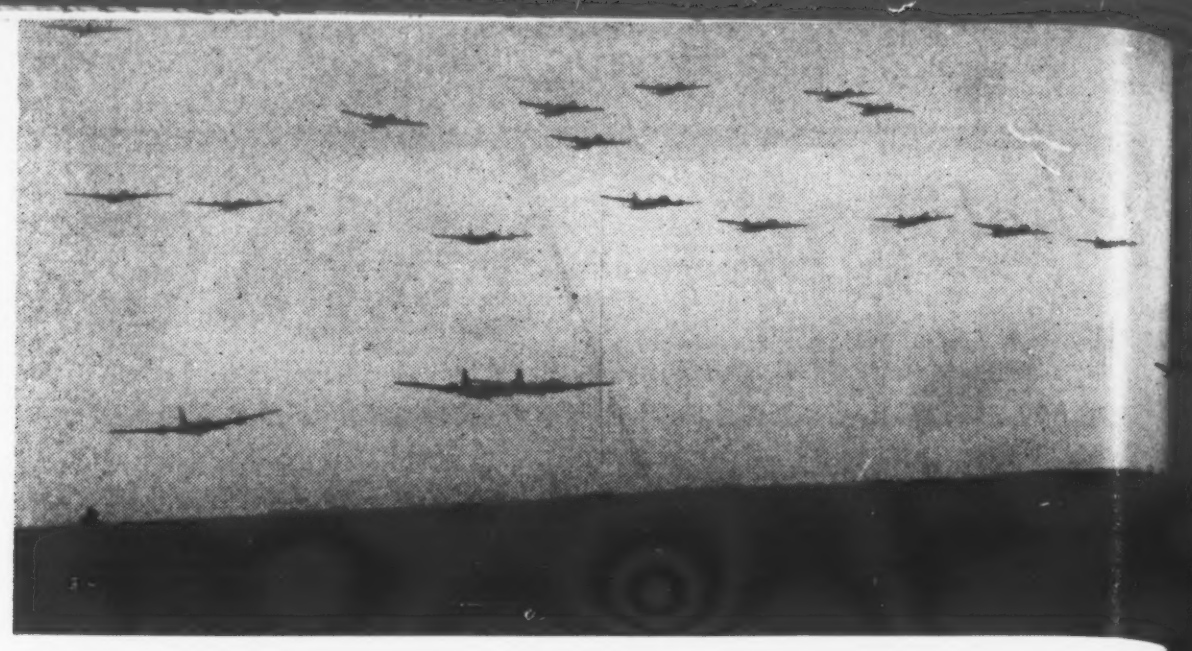
Air Force Developments

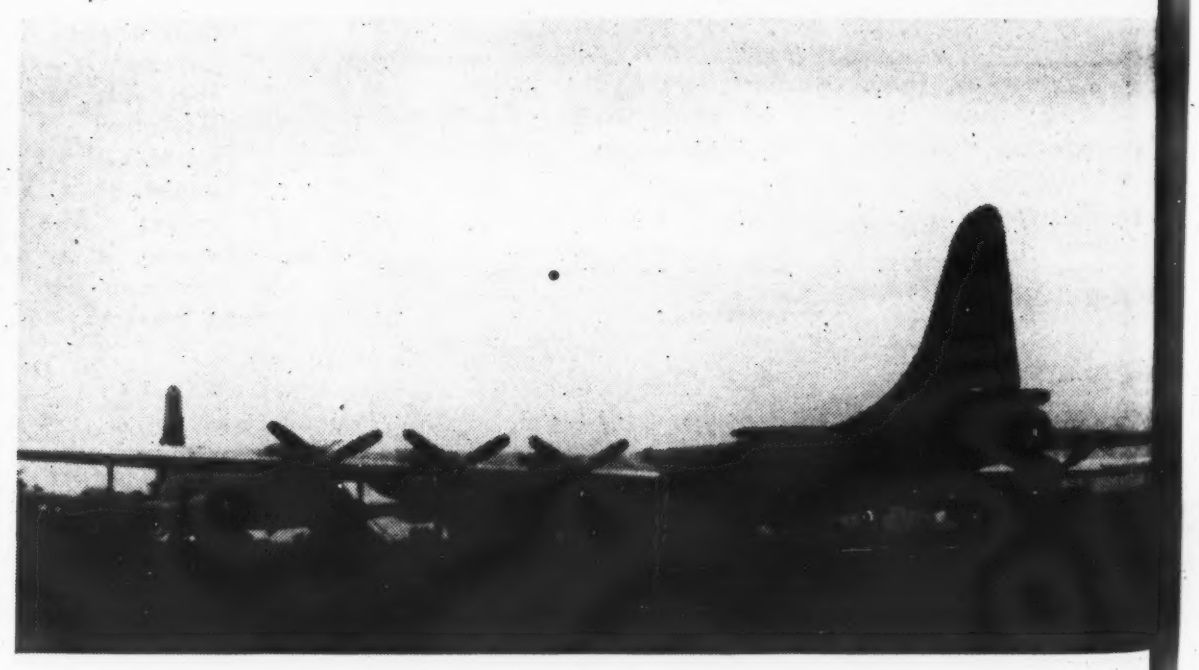
Right: The Buck Rogers outfit is a mockup of the new prone position pilot bed which greatly increases pilot's tolerance to gravitational pull. The gadget on the head is a counter-weighted support which relieves neck strain and permits head movement at extreme "g's."

Below: The prone position pilot bed mounted in the nose of a B-17 for flight testing.

Right: Two improvements in AF equipment. The suit is an electrically heated flying suit, difference between it and older types being that this one contains sufficient insulation to keep the wearer warm without electrical power, in event of a bail-out in cold climates. The radio transmitter shown is a new version of the "Gibson Girl." In this set voice transmission has been added.

Left: The fire fighting suit is made of aluminum foil laminated to a smooth cloth base. The helmet is a one-way mirror, affording full view from within but reflecting rays directed at it from outside. Tests made within two feet of a 1500-degree fire showed that the suit reflected more than 99 percent of all heat rays, with the wearer's body temperature rising only one degree.



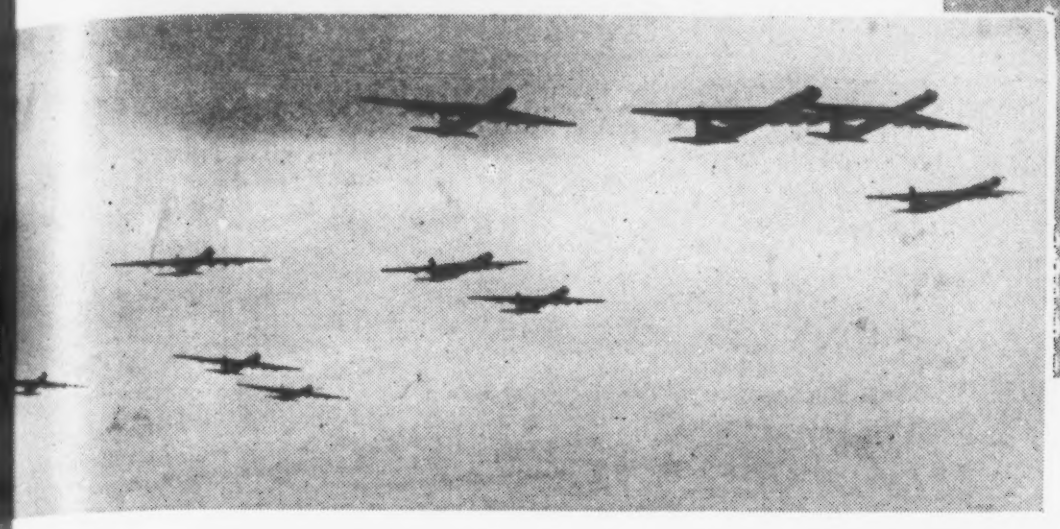


Scenes at the big show the Air Force staged for the President and the Congress at Andrews Field, Washington, D. C. W. Fingal of SIGNALS staff went over for a look at the show and brought along a camera. Top, the President talks it over with the Air Force chief, Gen. Hoyt S. Vandenberg. Center, meets the crew of one of the aircraft in for the show. And bottom, turns aside to mull it over while Air Force Secretary W. Stuart Symington, Col. David Schilling, and Gen. Vandenberg go into a huddle.

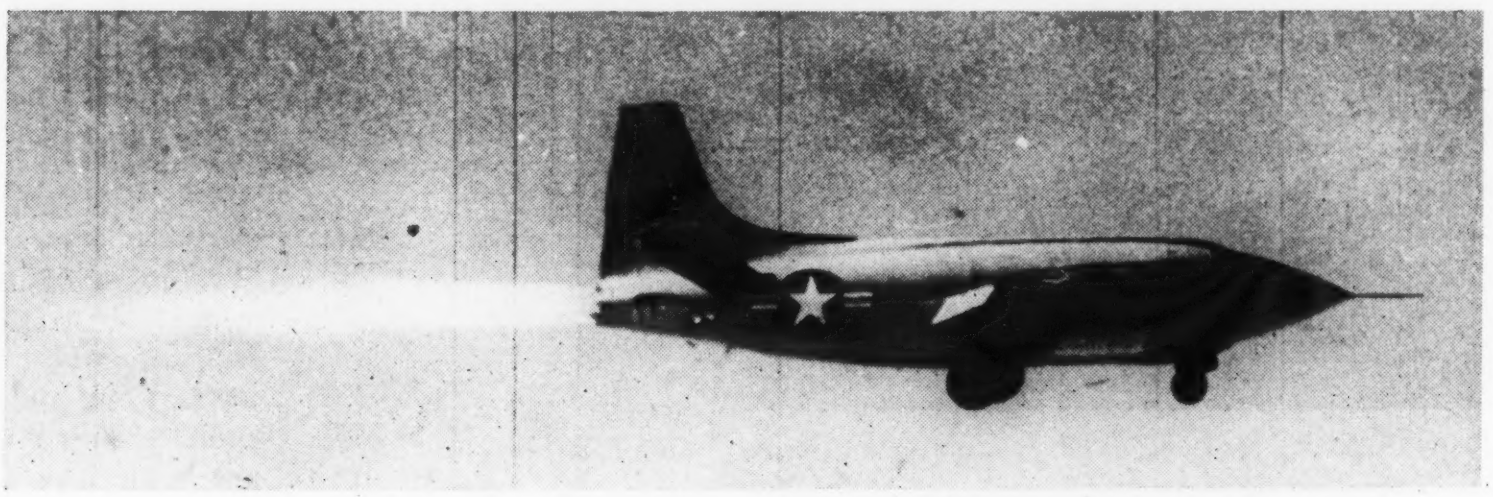
Planes in the air on this page are B-29's. Standing is a B-36, with a C-74 in front of it.

Aircraft were flown past the spectators beginning with old wartime planes—the B-17, B-25, B-26, P-39, P-47, progressing to the later B-29, B-36, and all the new jet planes, including the Flying Wing. A race was staged between the F-80, F-86, and the B-47. Five F-80's from the Fourth Fighter Wing at Andrews Field put on an acrobatic exhibition.

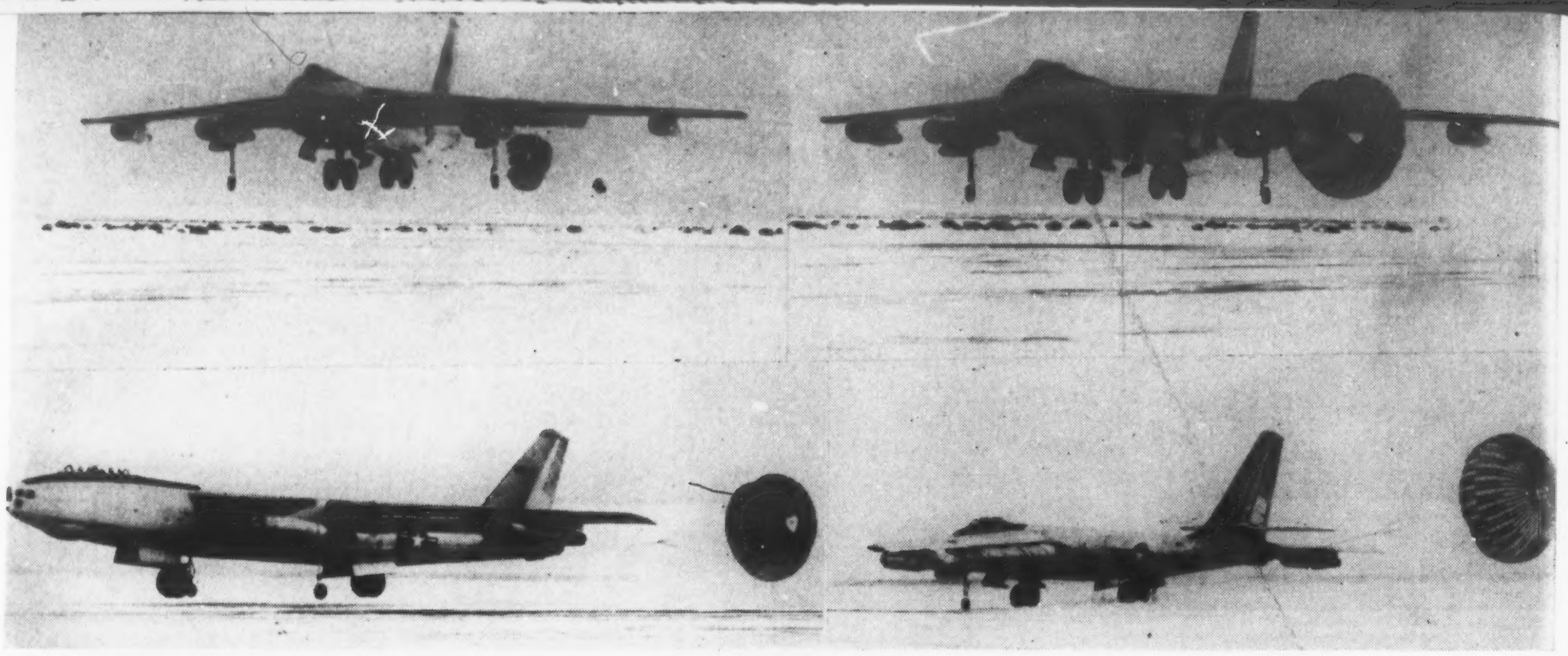
There were sixteen B-36's in the air at the big show staged for the President and the Congress. Here are some of them shown coming . . . . going.



The Bell X-1 on its first powered take-off. Rumor has the speed of the X-1 as being anywhere from just beyond that of sound to several hundreds of miles faster.

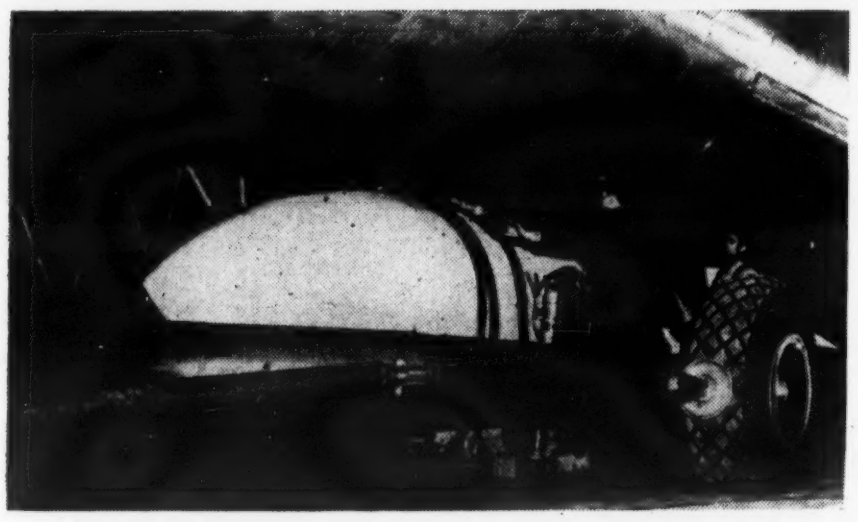


Ceremonies at the Smithsonian Institute marking the installation of the Kitty Hawk in the museum after its return from England. Behind it hangs another famous airplane in the advance of aviation, Lindberg's Spirit of St. Louis.



If you haven't got propellers on an airplane you can't very well reverse what you haven't got to slow up landings, so you throw out an anchor. Major Guy Townsend, Flight Test Division, Air Materiel Command suggested the parachute "brake." Here it is shown in a test with the B-47 Stratojet, world's fastest bomber.

The rocket mounts on this F-80 are retractible. They fold up into the wing, thereby removing what would be speed reducing obstructions.



The bomb being loaded into the B-36 weighs 42,000 pounds. Recently a B-36 carried two of them on a flight and dropped them on a bombing range in California.

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This is the new Air Force uniform. Center, the old and the new. Right, the aviation cadet's uniform. The uniform is blue, will be the same for officers and EM. The Air Force expects to complete the change by September, 1950.

AIR FORCE TRAINING OF RADAR AND COMMUNICATIONS TECHNICIANS

By M/Sgt. Ralph L. Thomas

The ceiling is low and the visibility is short. In a little shack at the end of a runway several men sit, their eyes glued to the greenish-yellow flickering of a radar scope. They talk quietly into the microphones before their lips. And every two minutes a giant C-54 touches down on the runway with another ten tons of supplies for the be-leaguered people of Berlin.

Magic? No, just another visible proof of the success of the United States Air Force in developing radar and communications to the point where weather has had to take a back seat as the flying man's enemy. But to maintain the equipment that keeps the Airlift going, to maintain the equipment that makes it possible for radar-equipped B-29s to lay bare the secrets of the little-known Arctic area, thousands of highly trained radar and comunications mechanics and technicians must be provided in a regular and constant supply.

The job of training the Air Force's radar and communications experts is the duty of two technical schools belonging to the technical division of the Air Training Command, with headquarters at Scott Air Base, Illinois. The schools are Keesler Air Force Base, Biloxi, Mississippi, for radar, and Scott Air Force Base, Belleville, Illinois, for communications.

Keesler is the home of the only radar maintenance school in the Air Force and is in addition the world's largest. With an operating staff of over 600 officers, enlisted men and civilians, 400 of whom are instructors, the school has a student body of 1500 radar personnel constantly undergoing training, with approximately 40 radar technicians graduating every week. The operating staff of the school are all hand-picked

Training on radar aircraft interception.

men, assigned because of their knowledge and skill in one of the most technical departments of the Air Force.

In order to qualify for entrance into the basic radar training course, an applicant must have at least eight years of formal education, possess an Army general classification test score of 100, and be cleared by the base intelligence officer to handle confidential material. The majority of the students in recent and current basic classes are men between the ages of 17 and 20 who are in their first enlistment following graduation from high school.

Three Main Branches

The enlisted section of the radar school is actually divided into three main departments: The fundamentals branch, the ground equipment branch, and the airborne equipment branch.

Upon entering the fundamentals branch of the school, the basic student finds himself embarking on a long, complicated, but highly interesting training course. For the next 26 weeks he finds himself receiving a thorough grounding in the principles of basic algebra, electricity, and elementary electronics as applied to radar. Every item is necessary if he is to successfully complete this course and go on to the higher echelons of radar maintenance. These basic students are received directly from the Air Forces indoctrination centers, after having been carefully screened to ensure that they meet the minimum prerequisites outlined above, and that they are adaptable to radar training.

The training is conducted on the basis of a six-hour day and a five-day week covering a period of 26 weeks. However, due to the rapid expansion of the Air Training Command that is resulting from the Air Force's planned expansion, it is necessary to operate in two shifts at the present time, with each shift split into both classroom discussion periods and laboratory demonstration periods.

After successfully completing his basic course, the student radarman finds himself diverted into the general radar mechanic course, which lasts approximately 16 weeks. The general radar mechanic course is set up

to provide overall radar mechanic training which, when supplemented by a minimum of on-the-job training, will qualify an airman for duty in any one of several radar mechanic specialities. Students in this course receive intensive grounding in electricity and magnetism, alternating current, vacuum tubes, power supplies transient and special circuits, amplifiers, oscillators, electronic timers, synchro and servo mechanisms, analysis of an oscilloscope, electronic shop work, modulation and detection, transmission of micro wave energy along with its generation and propagation, application of electronic principles in a complex radar system (bombardment equipment), application of electronic principles in miscellaneous radar systems including ground control approach equipment and radar gun-laying equipment, long range navigation equipment, radar altimeter equipment, and radar identification equipment.

Specialized Courses

Following graduation from this course it is usually not until the second enlistment that the radar mechanic is experienced enough to enter into the advanced course for bombardment equipment repairman. There are four types of specialized reporting equipment courses, which are: the long range micro-wave early warning set, which is a permanent installation; the aircraft altitude reporting set; the medium weight portable early warning set; and the extremely light weight set whose value lies in the easy transportation under combat or other adverse conditions.

Students who are selected for training as bombardment equipment repairmen are handpicked from men who have demonstrated outstanding ability as radar mechanics while working with one of the first line units of the Air Force. One of the determining factors for selection of an airman for this course, after his ability has been carefully evaluated, is whether or not he has evidenced the desire to make the service his career.

The bombardment radar equipment used by the Air Force is one of the most complex electronic devices in current use. It makes it possible for a striking force to lay their bombs on the target regardless of darkness or weather conditions that make it impossible to see the ground. The principle of the equipment is much similar to the principles of television, making use of electro-magnetic wave energy to produce a picture on the radar scope clearly showing the terrain below. With a few modifications, these same principles are employed in the ground control approach equipment widely used to bring a plane into a safe landing during overcast and foggy conditions when it is impossible for the pilot to see the ground.

Learning to write backwards on the transparent plotting boards.

Another deviation in the function of this equipment is its use with gun-laying for fire control. The radar beam automatically finds and tracks the target, making possible precision gunnery which cannot be achieved by any other method.

Supersonic Trainer

One of the most outstanding pieces of equipment used in the bombardment course is a mock-up known as the "supersonic" trainer. This training device permits the student to "fly" as a bombardier on a raid over prepared "targets" installed in the trainer. The trainer actually charts the course for the student operator and gives him the effectiveness of his strike on the target.

The remaining four reporting equipment courses provide training in the highest echelon of maintenance and repair of the four types of ground reporting sets. Training on AN/CPS-1 provides for the maintenance of the long range, early warning installations that provide warning or knowledge of the approach of aircraft long before they can be detected by any other means. The radar screen around Britain provided by the early models of this type of equipment was the determining factor in the destruction of the German air fleet in the Battle of Britain. The distance at which an approaching plane can be detected depends largely upon the altitude at which the plane is flying.

Training on AN/CPS-4

Almost a companion course is the training given on the radar set AN/CPS-4. In general, this equipment is used in conjunction with the AN/CPS-1 set to form a ground control intercept station. This particular type of set is especially designed for the determination of the altitude at which an intercepted aircraft is flying. Operating with the early warning equipment, the altitude spotter makes it possible for complete ground control of planes. With the AN/CPS-1 providing the information on the location of aircraft, and the AN/CPS-4 providing the altitude information, control of the airborne traffic and the operations of fighter and bomber aircraft is far more simplified than when these activities are handled by radio alone.

The courses on the other two types of early warning equipment provide for the same training as on the long range stations. The function of both sets is the same, the difference being that in being lighter and mobile, the sets are naturally less powerful and have a shorter range than that of the permanent installations. However, both sets are used in conjunction with the altitude spotter to form ground control intercept stations.

Going from the field of electronic "seeing" to that of electrical and electronic "hearing", an observer goes from Keesler AFB to Scott AFB, Belleville, Illinois. From basic field telephone systems all the way through the vastly complicated and highly technical communications system (including all types of fixed wire lines, the telephone, telegraph and the marvelous phenomena of facsimile) on to radio communications from the basic stages through to the advanced, even frequency modulation (FM), the entire comunications system of the Air Force is serviced by graduates of the Air Force's communications school which has been located at Scott since 1940.

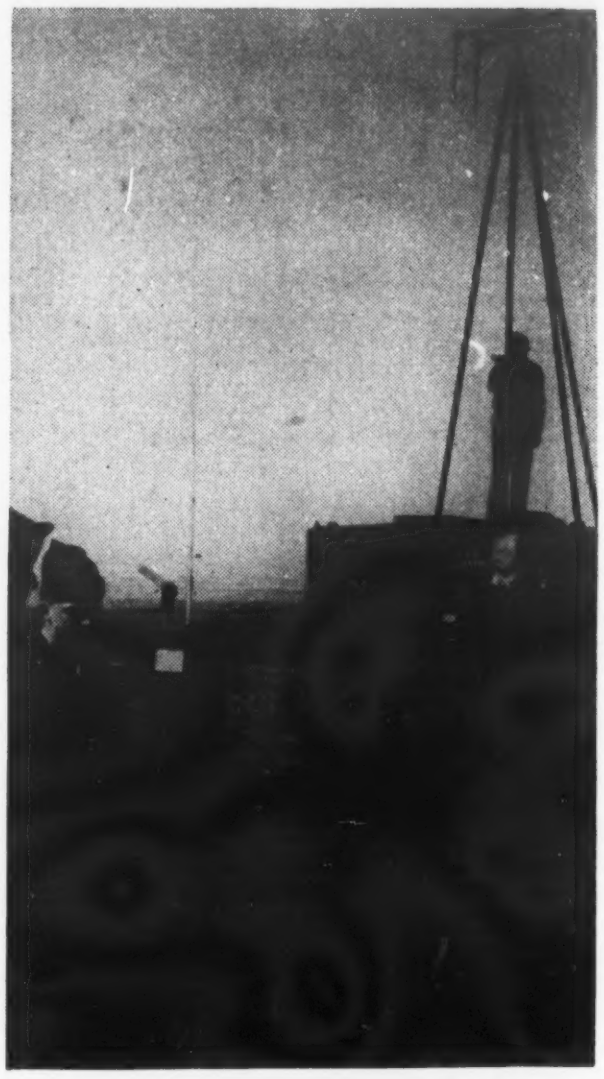
The school itself is composed of seven different departments, which in turn sponsor thirteen different communications courses, and qualify the trainee in many more communications specialties. The smooth functioning of all the departments is the responsibility of the operations and training section, which establishes all training programs, evaluates instructors, monitors examinations and grading, and maintains all requirements of the school as a whole.

Radio Mechanic Course

The largest section of the school is the aptly named Department of General Radio Mechanics, which produces basically trained radio mechanics and radio repairmen to handle airborne radio equipment. The student who enters the radio mechanic course finds himself slated for 36 weeks of instruction in just about every basic radio mechanic specialty. The content of the course turns out men qualified to maintain airborne radio sets, work on the equipment of the Airways Communications System, or take their place as an operator in a controlled net system.

Even though it seems that a technical specialist should be more closely channeled into one function, it has been found through practice that the system of teaching basic specialties has proven particularly successful both as to the quality of graduates and in the interests of economy.

In the general radio mechanic department, the basic airman is taken through the fundamentals of electricity and radio and made well acquainted with the maintenance of various types of standard radio equipment. In all of the communications



Training in orientation of VHF Antenna.

schools, the student spends an average of thirty hours a week absorbing instruction, and in the radio mechanic course about half of his time is spent in the laboratory doing practical work.

Advanced Course

Once he graduates from the mechanic school, and has spent some time working in his basic speciality, the embryo radioman is eligible for the advanced course of radio repairman of airborne equipment. For twenty-three weeks he will find himself involved in the advanced theory of maintenance and the complications of depot type repair. During this period of training, he spends only a third of his time in the classroom, listening to lectures, and the last six weeks of his training is accomplished entirely by doing practical work in a model depot communications shop where any kind of a problem can be duplicated.

Or if the radio mechanic has switched his talents to working on the Air Force's ground equipment, he can come back for training in the advanced course covering power units, communications, receivers, heavy transmitters, radio-teletype equipment, radio relay systems, direction finding aparatus, radio ranges, and on into depot level procedure and repair.

The ground equipment mechanic spends a little more time on his advanced training than the airborne equipment man does, taking thirty-four weeks to probe deeper into the inner workings of radio. At the beginning of the course the student is given a brief refresher in theory, to recall some of the academic training that has been inevitably forgotten in the lapse of time between his graduation from basic radio school and his entry into the advanced school.

After the refresher period, he then spends most of his time in the field, and the last several weeks of the course call for him to apply the principles he has learned to the actual erection of antennas, setting up radio relay networks and direction finding stations, and servicing a radio range station. Since the entire idea behind the training is to simulate actual detachment or line conditions, the field work goes on, regardless of wind, rain, heat or snow.

From maintaining a radio network to actually being an operator is similar, from the technical standpoint, to the difference between "crewing" a plane and piloting it. But the communications school makes the jump and companions the radio mechanics courses with a general radio operator course to qualify student operators for all duties which involve any use of radio equipment or any procedure for transmission and reception of radio messages.

Generalized Training

The student who qualifies for entrance into the operator course finds himself headed into thirty-two weeks of generalized training which will polish him into a technician capable of holding down any one of seven different jobs, such as radio operator, high-speed operator, high speed airways communications operator, and flight radio operator. This course is the starting point for all Air Force radio operators and it is here that their careers are molded and directed.

Naturally, the first and most important thing a new student must acquaint himself with is the International Morse Code. Hours are spent in both sending and receiving the dits and dahs until the student is so proficient he can almost talk in code instead of using words. Then he becomes progressively well-versed in the organization of tactical radio nets, message handling, the radio

compass, instrument approach systems, and radio ranges. Weather reports and their significance are made plain to him. Then he goes on to learn radio telephone procedure, and gains a working knowledge of radio sets and parts until he is able to perform minor general maintenance on the equipment with which he works.

Once well grounded in fundamentals, the next step of the course takes the student into simulated ground operation which covers the installation of a radio station, and then, as a sort of a grand finale to the course, he engages in simulated flight operations which call for the filing of flight plans, position reports, requesting of field conditions, obtaining surface winds and instrument clearances, and sending and receiving other normal or emergency transmissions.

Tactical Control Center Training, Tyndal Air Force Base.

Land Lines

Not all the training is confined to transmission of signals in the ether. The Air Force's system of land lines is just as important and receives just as much attention as does the radio schools. Scott's department of fixed wire communications supervises six courses in that field, training men to be cable splicers, installer repairmen, telephone and telegraph repeatermen, teletype mechanics, telephone and telegraph equipment repairers, and facsimile technicians.

At the present time, the cable splicer and the installer-repairman courses are separate, but are to be merged in the near future to produce a technician capable of installing telephones, hanging messengers, and repairing and installing cables under any condition anywhere in the world. The training received starts off the new man with a thorough grounding in electrical and telephone fundamentals. Then he is successively instructed in substation equipment installations, special testing and repair practices, outside plant-splicing, cable splicing fundamentals, substation equipment repair and central office installation. A student graduating from this course comes out a specialized inside plant installations and repairman.

The airman who elects to direct his career into the channel of a telephone and telegraph repeaterman or a telephone and telegraph equipment repairman finds himself concerned with the operation of the 100 mile spiral-four system and all voice frequency repeaters. In both these courses, the innumerable amount of equipment used makes it necessary for theory to be taught right along with the practical demonstrations.

The repeaterman must know the theory, operation, and checking of all types of voice frequency repeaters and voice carriers. He is taught to use and operate the CF-1 carrier, the CF-2 teletype carrier, and learns the intricacies of power equipment and rubber cable splicing. He comes out of his training highly versed in the use of test equipment, telephone central office equipment, basic telephone and telegraph circuits, basic signal communications, and ordinary telephone and electrical fundamentals.

Teletype Training

But if the trainee aims his efforts toward becoming an equipment repairer, he finds himself concerned first of all with the fundamentals of electricity and telephone fundamentals. From there, his training quickly expands to encompass telephone plant systems, central office maintenance, voice frequency repeaters, telephone carrier systems and teletype introduction, teletypewriter and telegraph carrier systems, maintenance and repair procedures, and as frosting on the cake, he receives a small amount of familiarization in automatic telephone systems. The man who qualifies as a repairman finds himself in a position to qualify in any one of four or five communications specialties by enlarging on his course of instruction through a small amount of on the job training.

The present trend towards the increased use of automatic tape transmitting and receiving equipment has resulted in a widely expanded course of training in the teletype mechanic field. The present course, recently extended from eight to eighteen weeks, is set up to give the student a solid back ground in both the theoretical and practical side of teletypewriter communications. Each student is provided with his own machine while in training, and as a result he is able to solve his instructional problems in a very practical manner.

Facsimile and Cryptography

The last course in this family is the facsimile technician course set up as a transition course for AACS and Air Weather Service airmen who are already qualified as radio mechanics. During this course they pick up the details of facsimile equipment fundamentals, mechanical maintenance and repair, circuit analysis and trouble shooting, and reach the level of being able to perform all duties of depot repair and maintenance of facsimile machines.

In any system of transmission of classified military information, security becomes of paramount importance. The Air Force maintains this security by using intricate cryptographic devices. The operators for these devices are trained in the cryptographic school at Scott. In addition to the training provided the student in operation and maintenance, he is throughly indoctrinated with the principles upon which security is based and the rules by which he must abide.

So, whether it's a C-54 on the Berlin airlift, a B-29 flying the Arctic wastes using radar navigation, or just Pfc. Joe Doakes calling the orderly room, always in the background is the man behind the man behind the gun, the radar or communications technician making sure that nothing stops the Air Force from seeing and hearing around the world.

BOOSTING TRAINING FILM OUTPUT TO MEET ARMY EXPANSION

By Donald Becker

When national emergency sweeps thousands of draftees into an expanding Army and puts unusual stress on the training program—that's when the Signal Corps doubles its output of training films and adds new links to its world-wide motion picture distribution system.

This fiscal year, the Office of the Chief Signal Officer has disclosed, 75,000,000 feet of film will pour from the Signal Corps Photographic Center at Long Island City, N. Y. The pictures will be based on new tactical doctrine crystallized from combat experience. There will be an estimated 600,000 screenings in the United States alone. Thereby, second-edition GI Joes will be assured the latest in visual aids, visual training aids which proved their worth in the greater emergency of World War II.

These new titles will be duplicated — sometimes in the hundreds — and allocated to troop concentrations through 141 Signal Corps film libraries. They will be used by training officers of all branches to forge soldiers from inductees in a hurry; not, of course, to the exclusion of "live" instruction, but as a time-saving adjunct. They will be shown, also, to maintain morale by telling the citizen soldier why he's in uniform. And their use will be analyzed by a continuous, comprehensive statistical control designed to gain maximum benefit from every print.

It is a unique activity, this application of celluloid and shadow to the grim job of girding for defense. Nowhere else in the Army — nowhere else in the Nation, for that matter — is there anything exactly like the post on Long Island.

That's right — it's an Army post, not a "studio." The officers who run it are quick to make that clear. Yet behind the signs warning that this is a military reservation, so stay away, please, there is a daily cooperative effort to translate training doctrine into building blocks of soldier learning.

Producing the Film

The inception, manufacture, distribution and utilization of a training film are quite different from those of its Hollywood cousin. So if you care to join a reportorial trip beyond the guard at the Signal Corps Photographic Center (henceforth referred to economically as SCPC) you will learn the story of one film, which is essentially the story of them all. You will hear about TF 19-1485, "Wearing of the Uniform," a motion picture every inductee will see almost as quickly as he can raise his right hand and swear to defend the Constitution of these United States.

Back in the post-war demobilization period, a high-ranking officer in the Office of the Provost Marshal General had occasion to travel about the country by rail. Much of what he saw of soldier conduct, he didn't like. He saw disorder. He saw the uniform so individually varied that it appeared in one observed case even with a bare midriff. He realized that this was one phase of a soldier's life that needed immediate attention. When he returned to Washington he asked for a training film to meet the problem.

Not every subject is suitable material for a motion picture, and a training film request is first analyzed in the Office of the Chief of Staff to determine if it is practical. "Wearing of the Uniform" was felt to be an ideal subject for translation into a motion picture, the kind of subject the Army-Air Force Troop Information and Education Division of the Special Staff also could use in light of the Army's new emphasis on explaining to the soldier the why — as well as the what and how — of military life. (In fact, I & E liked the film so much that excerpts were pieced into an issue of the Armed Forces Screen Report under the title "Something about a Soldier" and shown in service theaters throughout the world. The Armed Forces Screen Report is a short documentary film produced monthly at SCPC.)

Upon approval of the Chief of Staff, the request for a morale-building film on the uniform went to the Chief Signal Officer, who directed the Army Pictorial Service Division to start the ball rolling at the Signal Corps Photographic Center. The authorization was received by SCPC together with an outline of what was wanted. A project officer, the Army's version of a Hollywood producer, was assigned to the project by SCPC, while the Office of the Provost Marshal General assigned one of its own officers to act as a technical advisor. His job was to be sure that what SCPC cameras recorded was strictly according to Army Regulations, field manuals, technical manuals, circulars, and assorted directives. He had to be a man with a long memory and an eagle eye.

Once safely beyond a purely military scrutiny, the training film project entered a phase bearing a closer resemblance to the West Coast way of doing things. A writer was assigned who, together with the project officer and technical advisor, developed a scenario. His was the difficult job of trying to make Army regulations sound interesting, of keeping troop audiences awake when they'd just as soon doze. He couldn't use much humor, because — unlike an entertainment film — a training

"Germany" street scene . . .

film might be seen several times by the same audience, and a joke thrice repeated can fall pretty flat. He wasn't allowed to use much sex. He couldn't count on well known actors to maintain interest, because if an actor is too well known, he gets the attention instead of the lessons the film is trying to teach.

The writer used self-respect as a motivating thread throughout the picture, drawing parallels between civilian dress and the uniform, between civilian situations and Army life. For example, a civilian zoot-suiter bent on annoying the girls appears early in the film. Later he shows up in uniform, but while his dress has changed, his character hasn't. Thus the inductee is encouraged to digest the film in terms of his own experiences and to see that the gap between civilian and military psychology is not so great as he might have thought. He is not asked to wear his uniform well merely because Army regulations say he should. He is shown that self-respect is self-respect, whether in tweed or olive drab.

When the scenario was written and approved by the Office of the Provost Marshal General, SCPC made ready to shoot the picture. Sets were designed and built with great attention to detail, and with all the movieland tricks, such as making store windows of non-glaring wire screen instead of glass. A director, camera crew and editor were assigned to the project. The casting office, drawing from Broadway talent, selected actors and actresses for the principal parts. Minor roles and crowd scenes were played by both military and civilian personnel at SCPC.

The shooting was done on several of the six stages at SCPC, one of them a block square and the largest in the East. Street scenes, a railroad car interior, a bank, a cafe, a crowd scene in "Germany" all were photographed within the walls of the Signal Corps post on Long Island. Speech was recorded separately, made into a sound track on separate film, to be re-recorded later by some of the most modern equipment available.

Editing the Film

As the scenes of "Wearing of the Uniform" unfolded a few feet at a time beneath the blazing lights, "dailies" or "rushes" were printed from each day's shooting and shown the following morning for the technicians charged with putting the picture together. They watched for photographic quality, for accuracy in telling the story, for a creative pattern that would enhance the significance of the training film.

After all the shooting was done, the film editor put the scenes together. This was no mere mechanical job. Much of the tempo of the story developed in the editing rooms. Here the pattern was completed, the relevancy of all the separate scenes made clear. Sound effects and music were selected from a large assortment and arranged for future combining, or "dubbing in" with the dialog as one sound track.

Where the script called for "stock footage," that is, film already shot and kept on file, such as a New York City parade scene that appears in "Wearing of the Uniform," recourse was made to the SCPC library. Here 40,000,000 feet of motion picture film can be drawn upon readily, for it is indexed six different ways. The library, pictorially speaking, covers the world. It even has some footage that bold Signal Corps cameramen managed to shoot behind German lines during World War II, and which was used to give wartime training films authenticity.

Narration was recorded after the film was shot, being changed from the script where necessary to fit revisions made by the director, editor and project officer as the picture developed. It is an oft-heard axiom around SCPC that "no one person makes a motion picture." Training films grow, they are not stamped out on a big machine; they grow from a need and an idea, and growth means change.

With the narration for "Wearing of the Uniform" recorded on a separate sound track—and with "live" or synchronized dialog, sound effects, and music also on separate tracks—it was necessary to combine all into one track. So the Sound Department projected all tracks simultaneously and re-recorded them into a single track.

To produce the right combination of voice and other sound, required technicians with agile eyes, ears and hands. These men, called "sound mixers," made sure all sounds were blended at pleasing levels during the re-recording process. The re-recording sessions seemed an endless series of sound mixing rehearsals, until a

. . . reproduced in Signal Corps Long Island film studio.

sound track mixture was obtained that pleased all those responsible for the picture.

As soon as the picture was put together, an "answer print" was rushed through the laboratory, checked at SCPC for technical imperfections, and then shipped to Washington for review by the Office of the Provost Marshal General, the Office of the Chief Signal Officer, and representatives of the Army General and Special Staffs and of the Army Field Forces.

When the answer print was returned by Washington with top-level approval, distribution instructions — based on full, long-kept statistics of the Army's film needs — were issued and the laboratory went to work to make prints, 260 of them for initial distribution of "Wearing of the Uniform."

Making the Duplicates

While the SCPC technicians who shoot pictures sometimes have occasion to use cobweb-making and dust-making machines (when they want a touch of antiquity in a hurry) the laboratory people do everything they can to keep dust away from the thousands of feet of film they process every day. Air is filtered electronically, sponge-rubber mats in hallways take dust off shoes, and a system of dumbwaiters and windows permits passage of film from floor to floor and from room to room with little movement by people. Motion stirs up dust.

The laboratory at SCPC, already using a staggered system of workshifts that often keeps it operating until 2 in the morning, is in the process of adding equipment that will increase its capacity 100 per cent. Personnel also will be increased, as an expanding Army's demand for training films grows and grows.

When the laboratory received the initial order for 260 prints of "Wearing of the Uniform," its first job was to inspect the negative for variations in exposure. This was done by a highly skilled technician, who determined, for each scene, which of 22 grades of lighting had to be used in printing so that the finished product appeared evenly lighted on the screen.

From the original negative was made a master print, and from the master print, a number of duplicate negatives. This done, both 16mm and 35mm prints could be turned out in large quantities.

To speed up production, SCPC has made a number of changes in standard equipment, such as finding ways to print both pictures and sound track simultaneously on machinery that was designed to do only one at a time. The demands of defense call for an ever-increasing tempo of production at the photographic post on Long Island.

. . . for making of film "Wearing of the Uniform."

Those defense demands include the use of training films by Army civilian components — National Guard, Organized Reserve Corps, and Reserve Officer Training Corps — as well as by active units. Army Pictorial Service data on distribution show a steadily increasing use of training films since World War II, and they are looking for a new boom with the intensification of Reserve training and the Army's expansion. Part of this heightened demand for film will be met from World War II prints that were stored in warehouses and now are being inspected and placed in reserve stock.

Fitting the Training Program

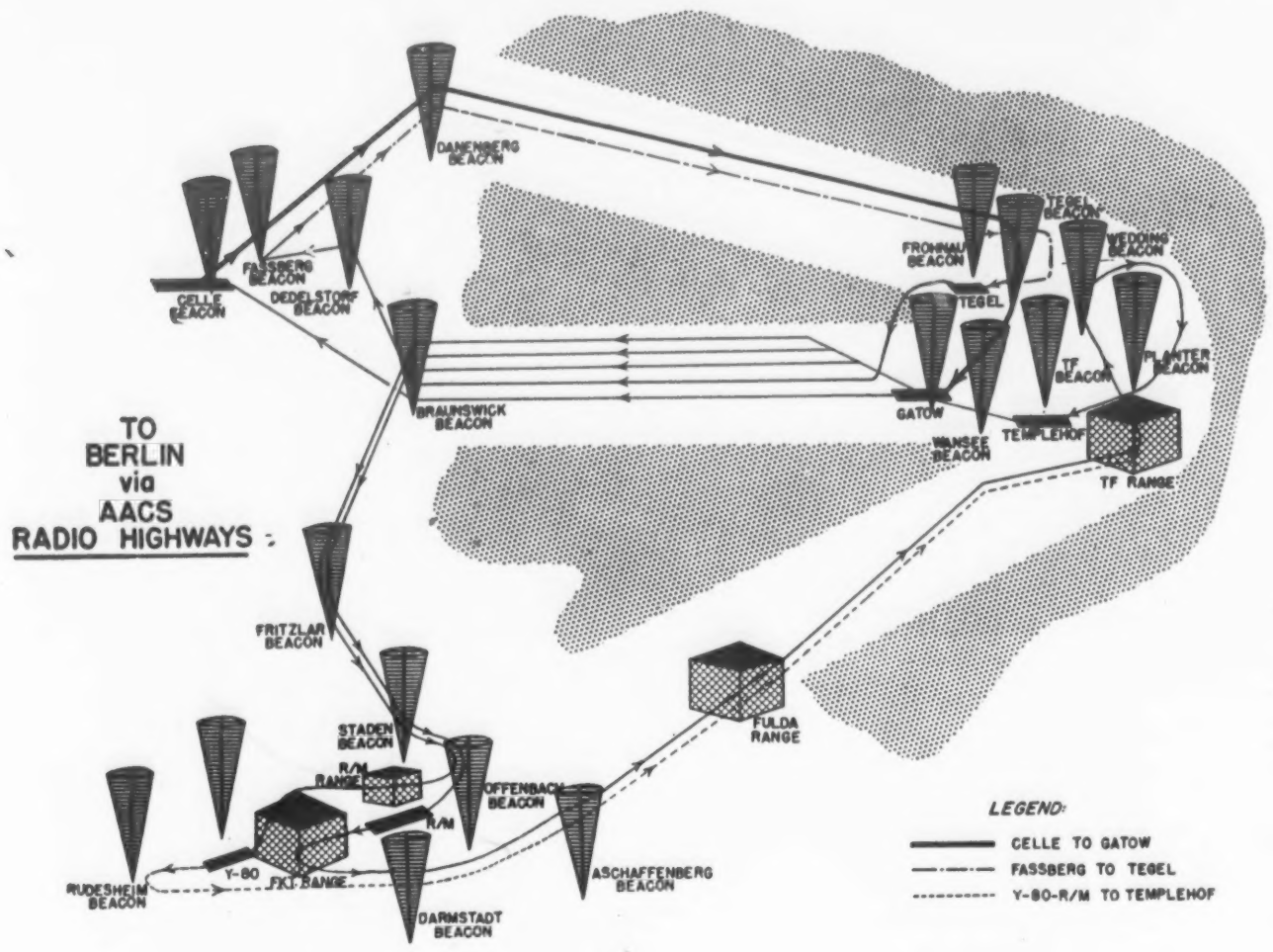
Many of these old prints, as well as recent pictures like "Wearing of the Uniform," will go to new Signal Corps film libraries at the new training centers. Basic films to stock these libraries have been determined from the constant inventory of print use kept by the Army Pictorial Service. A list has been prepared of the 350 most popular films, so that SCPC distribution people can anticipate the prints for which the demand will be heaviest. The Signal Corps keeps a statistical eye on every print of each training film, from the day it is made to the day it is withdrawn as obsolete. Prints not used in one locality may be transferred to another where the demand exists.

Initial distribution of "Wearing of the Uniform" was based on a number of considerations: geographical location of each film library, the concentration of troops served by each, the type of training being undertaken and the type of training for which the film was intended, and the availability of transportation with the corresponding amount of time involved in getting a print to its audience.

Signal Corps personnel who operate the film libraries try to guide training officers in the proper use of motion pictures, reminding them that films are not intended to do the teaching job alone, but to fit into an integrated training program. Mass use of films just for the sake of getting them shown is not encouraged. While the Army Pictorial Service is happy to count its monthly attendance in the millions, it wants to be sure that those millions have reaped the most instruction possible from the films they have seen.

Not only does the Signal Corps produce, distribute and help guide the utilization of training films, but it also is responsible for supplying the projection equipment with which they are shown, and for training the projectionists.

In all these phases of training film production and use, the Signal Corps is leaning heavily on the lessons of World War II. That means improving techniques wherever experience bespeaks the desirability. With the knowledge that films proved their value in a far greater emergency, Army training officers today demand more and more of them. And so the Signal Corps Photographic Center's cameras whir longer and longer, matching the pace of world crisis. They whir in an aura of make-believe; the back-stage smell of paint, the wooden guns, the Broadway actors speaking their lines suggest that somehow this must be only play. But the end product is something grimly real: a strip of film in a can that helps win battles, save lives, preserve the American heritage.



AACS, Balance Wheel In The Vittles Clockworks

By Wallace Fingal

Signals Staff

The stupendous airlift operation with the homespun backwoodsy title "Vittles" hadn't been in effect for long when it began piling up superlatives on air freightage. The figures on tonnage being hauled through the sky mounted so fast that each increase aimed at was rapidly reached, surpassed, and became a minor figure of the past. The tonnage possibilities of the lift hit a point by March of this year where the Russians, with unconscious hyperbole, were accusing the Americans of hauling factories and material aggregating hundreds of tons in weight *out* of Berlin compared with the tens of tons actually being flown *in*.

The Russians' exaggeration of the tonnage being lifted (aside from the fact of the complete fabrication) was an unintentional accolade which the Vittles operators no doubt accepted calmly as their due. For they have other phases of the operation than merely the tonnage figures to boast about. They know that they are handling air traffic on a scale which even willful misstatement could scarcely exaggerate. They know that never before have fleets of airplanes flown in such continuous regularity in all kinds of weather. They are putting airplanes down on the Berlin runways bare minutes apart, 24 hours a day, ceaselessly, in a precision of movement which is thorough clockwork. Even in clear weather the handling of the Vittles traffic is a masterpiece of air transportation. In bad weather it's a miracle.

Imagination is excited upon peering into the clockworks of this operation—especially in examining the electronics balance wheel that keeps the works in regular motion, the Airways and Air Communications Service of the U. S. Air Force. This service has been termed builders of "highways in the skies," "electronic tracks in the skies," among other expressions of admiration brought out of imaginations stirred by the wonder of their performance. The Air Force chief, General Hoyt S. Vandenberg, has stated that the work of the AACS "borders on the occult."

AACS Mission

The job that AACS is doing in Vittles is part of its express function in the Air Force. That mission is described in the regulation authorizing the communication service, as follows:

The Airways and Air Communications Service will operate (along such airways as military traffic justifies) airways communications, including electronic avigational aids, comprising the following types of stations: Fixed aeronautical point-to-point radio stations, ground-to-air radio stations, control towers, mobile control towers, radio ranges, marker beacons, direction finders, homing beacons radar beacons, mobile ILS, GCA units, Loran, teletype, power units for all kinds of equipment, communications stations for transmitting and collecting weather information and for flight services—air traffic control centers, necessary cryptographic sections and message centers.

Birth of AACS Idea

In the January-February, 1948 issue of SIGNALS Major General H. M. McClelland (then head of AACS, now Deputy Chief of MATS) related the interesting beginnings of AACS. The idea for the service was born out of an early flight of B-10 bombers led by General "Hap" Arnold over Alaska. On the long flight, made in various stages, General Arnold came to the realization of the necessity for adequate electronic avigation aids, including communications. As General McClelland described the flight:

"I was with General Arnold on that flight as his communications and meteorological officer and piloted one of the B-10's. We made a number of special arrangements for air-ground communications with existing radio stations, and although all concerned put forth their best efforts, we never really did line up anything even remotely resembling an adequate communications system."

After the return from Alaska, a bombing exercise in the States accented the lack of proper communications for Air Force aircraft in flight. General McClelland continues:

"We went on to Washington the next day and while there General Arnold stated a requirement for air-ground and point-to-point radio stations so located that an Air Force could move anywhere in the U. S. and always be in communication with at least one station in order to obtain important weather information, to advise of changes of flight plans, to alert transient aircraft—in other words to set up the type of organization that is now AACS. That was in 1934. In order to satisfy General Arnold's requirement for such a system, four years were required to hammer estimates through various budget agencies, obtain appropriations from Congress and procure the equipment needed to install some 35 A/G and point-to-point station in the U. S. That was the beginning of AACS.

"The purpose of AACS, in brief, is to support the movement of Air Force aircraft between various bases of wherever the Air Force is to fly. That is its sole reason for existence. With the first call from the control tower, the flight becomes an inter-base proposition. The pilot on the normal flight will use the tower during the take-off; he will check his progress with various aids, such as homing beacons, radio ranges, and direction finding stations; he will communicate for various reasons with air-ground stations and he will be assisted in landing at his destination by one or all of the electronic aids, such as radio range, GCA, SCS-51, traffic control and the control tower. All this goes on while the point-to-point networks pass messages concerning the flight by teletype or radio telegraph and collect weather information for forecasting purposes. All the services, together, are designed for the safe and expeditious movement of the flight."

This is the procedure in the Vittles operation as shown on the chart, page 24.

GCA in Vittles

Principal tool of the AACS men guiding planes into the Berlin airport is the application of radar and radio called GCA—Ground Controlled Approach. It isn't new. It's been known for some time to everyone concerned with avigation. There are even developments in electronic landing aids which have claims of outmoding GCA. But the men who run the Vittles lift say that without GCA the operation would virtually halt in weather conditions of low visibility.

Air traffic controllers at Tempelhof airdrome in Berlin.

Familiar trade mark of the GCA set at an airport is the yellow and black checkered five-ton trailer with its tractor—a four-ton cargo truck—which contains the set. Transmitters, receivers, antenna systems, and auxiliary units are within the trailer. The power units, and an air conditioning unit to absorb the heat in the trailer thrown out by 700 radio tubes, are mounted on the truck. The unit is completely mobile and can be moved from one runway to another as field limitations and weather conditions require.

GCA is composed of two separate, functionally independent radar systems, the search and the precision. The search system presents on a cathode-ray plan position indicator (PPI) a polar map giving azimuth and range information on all aircraft and obstacles within an approximate 30-mile radius. With this information the operator can locate aircraft within the search area and direct them to a point approximately ten miles from the approach end of the runway. At this point the aircraft appears on the cathode-ray scopes of the precision indicators (EPI) a triangular radar map giving azimuth and range information and adding thereto the third dimension of elevation. With this three-dimensional data showing the aircraft's precise position within a few feet, the ground operator is able to direct the plane down a prescribed glide path and onto the runway under emergency conditions and even in zero-zero weather.

The information shown on the indicators is relayed to the pilot by a radio communication system. No additional equipment is required in the aircraft.

For the non-technician the operational principle of GCA is simple, and might be described simply thus:

Two operators, sitting in a trailer parked at an airfield, each have before them a form of television set. The "screen" in the set, which they call a cathode-ray scope, is different from the television "screen" in that it is dark, with the objects appearing on it showing up as blobs of light. One set takes in a radius of thirty miles, the other concentrates on the area nearby the airport runway. An airplane approaching the airport is seen, as a blob of light, on the screen. If it should be a period of poor visibility, such as a fog condition, the operator of the first set talks to the pilot by radio, tells him where he is, and guides him into the orbit of the second operator. The second then takes over, also talking to the pilot by radio, telling him where he is in relation to the runway, and guides him down to a landing.

GCA's First AF Test

The landing aid called GCA is about six years old, dating it from its first Air Force test. That was accomplished at East Boston Airport in 1943 when Colonel Stuart P. Wright made a blind GCA landing under instrument weather conditions. On a visit to the Boston airport as an observer for General McClelland, then head of AF Technical Services, Colonel Wright volunteered to test the new landing aid when sudden snow flurries and soupy weather prevented the regular pilot, who had no instrument rating, from flying. Taking off in the snowy "soup" Colonel Wright made ten approaches and landings to convince himself that the first couple of landings hadn't been

just luck. His enthusiasm, thereupon, was so great that he urged General McClelland to make a special trip to Boston to see GCA in action.

After personally flying GCA and realizing the potentialities of the radar landing aid system, Gen. McClelland arranged a demonstration to take place at the Washington National Airport in May of 1943. Successfully persuading the USAF and the RAF that GCA was the answer to one of aviation's worst problems, Gen. McClelland's confidence in GCA's value to aerial military operations resulted in the order and delivery of the first GCA units to the Signal Corps in December of 1943. Shortly afterward the first unit was rushed to England where Airways and Air Communications Service personnel applied it to safely landing RAF and Eighty Air Force planes in instrument weather.

During the war GCA found steadily increasing use in all theaters of action. But never were its potentialities so fully utilized as in the Vittles short-spaced, never-ceasing landings. And even there the Air Force was not prepared to expand the application of GCA to the need.

Old Procedures Outmoded

When the blockade of Berlin began on June 26th, 1948 and Air Force transports brought into the city the first food in quantity (80 tons of it), the haul was accomplished with standard Air Force flight procedures. At the time it seemed that that would do. For nobody in the theater expected the lift to last longer than a few weeks. There was no thought of carrying it into the winter. In fact, the orders to Brig. Gen. Joseph Smith directing him to organize the lift stated that the assignment would be for forty-five days. General Clay had set a figure of 500 to 700 tons a day as being the maximum lift he expected.

But as the isolation of Berlin continued, and more and more planes were brought to Germany to assist in the lift, it became increasingly evident that the air traffic control procedures used in the United States would not fit this situation. In adverse weather planes stacking up over the Tempelhof range meant less tonnage delivered because of the time added in bringing them down. When space over Tempelhof was saturated the stream of planes from the west had to be severed at the source until the jam above the Berlin airport could be eliminated.

Rhein/Main's AACS transmitter site.

Before long Vittles settled down to a 24-hour-a-day, 7-day-a-week schedule. Limited air space and the constant flow of traffic into the congested area were making it imperative that strict traffic controls be developed to fit the extraordinary situation. One fundamental requirement was a straight-in approach, since it would eliminate stacking procedures used by Air Traffic Control in the United States where oftentimes planes shuttle for one or two hours on a range-leg before receiving clearance to descend to the field.

AACS Meets Emergency

The pressure was now on the Airways and Air Communications Service to bring in the lift airplanes regularly in short-spaced intervals in all weather. Responding to the exigency AACS rushed men and equipment to Germany from their stations in all parts of the world. Equipment stored in European depots was brought out and put into operation on the lift.

Typical of the rapid movement of equipment, often from far places, was the procurement of one of the GCA sets now in use at Tempelhof. The urgent need for additional GCA's at the Berlin airport in the early days of Vittles sent two C-54's flying to an Air Force station in Canada, above the Arctic Circle, where one of the AACS's newest air transportable sets were installed. Seven days later this 14-ton, 132 piece unit was in Berlin after having been disassembled at the Canadian station in 50 below zero weather and flown to Langley Air Force Base in Virginia where it was completely assembled and checked before being sent to Europe. A trained crew was formed to accompany the equipment to Europe and all necessary parts were secured. This unit alone, at Tempelhof, within a two month period directed 850 planes for blind-landings in instrument weather conditions.

Gradually, as dependency on the airlift of supplies grew with the lengthening blockade of Berlin, the AACS developed the split-minute timing of aircraft take-offs, flights, and landings, even in extremely adverse weather. The present system combines GCA with flight traffic control surveillance radar to land airplanes at less than three-minute intervals.

A plane on final approach is controlled and directed to a landing by GCA while the surveillance radar directs a second plane, five miles behind the first, into position for final approach. As soon as the first airplane lands GCA takes over control of the second, and the surveillance radar shifts to the next approaching aircraft.

AACS celebrated its 10th birthday last fall. In the 10 years of the existence of this communications and avigation aid service, Air Force pilots all over the world have come to a high appreciation of its value.

In the Berlin airlift AACS operations have been vital. It is not too much to speculate that without the aid of AACS's electronics wizardry the airlift might now have failed. Certain it is that in the inhibiting weather conditions of the recent winter months the lift would have slowed down to a tonnage haul that would have left the American section of Berlin in an extreme short-ration stage by spring, with a toll, too, of many planes wrecked and pilots killed.

Considering AACS performance in Germany, General McClelland seems now to have made a prophetic statement when long before Vittles he said, in considering the role of AACS in the then future; "we think we are barely on the threshold of electronic applications to problems involving aids-to-avigation and flight control."

"VITTLES" IN MONTANA

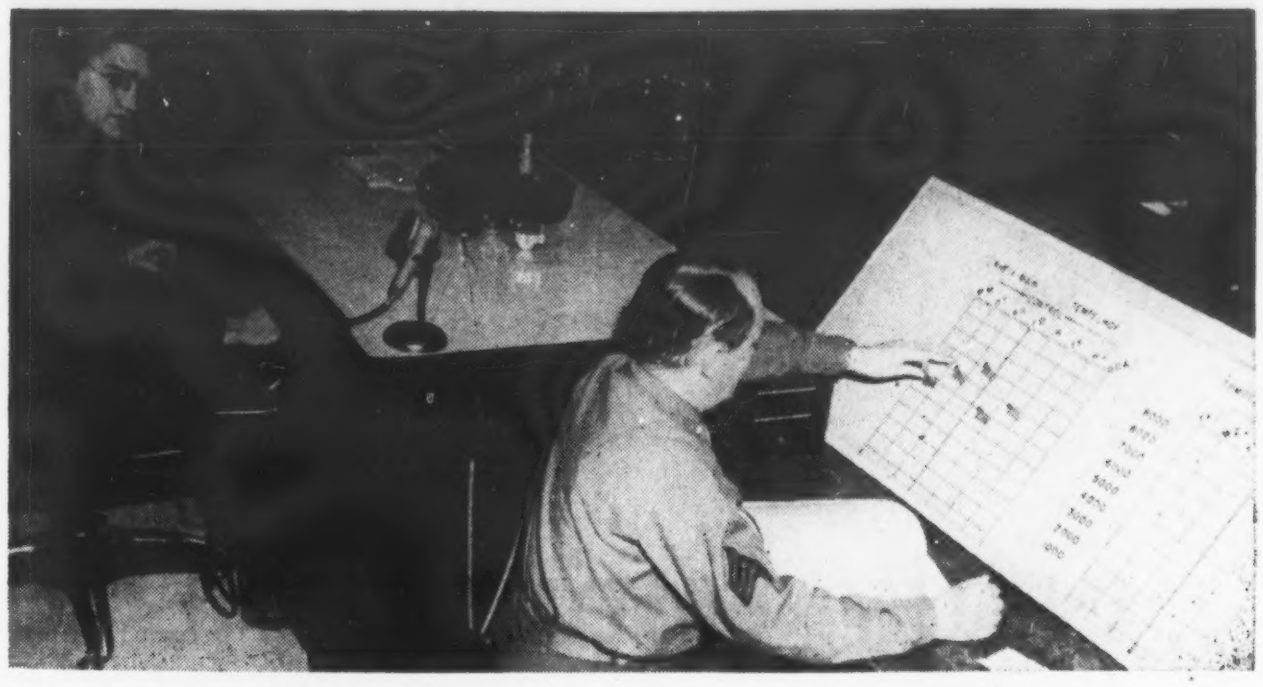
SIGNALS *was among newspapers and periodicals recently invited by the Air Force to send representatives for a ride to take a look in on the Great Falls, Montana, Air Force Base where special training is being accomplished to produce airplane crew replacements for the Berlin airlift operation.*

Wallace Fingal of SIGNALS *staff made the trip to the Great Falls base.*

A man has to have a little extra something on the ball to fly the mosaic pattern of the Vittles lift. Not that the pattern is complex beyond ordinary understanding. Actually it is such a marvel of efficiency that in operation it becomes fairly simple. But each person in that operation has to be well trained to maintain the smoothly running efficiency. The pilot has to have had recent familiarity with multi-engined aircraft, and have a knowledge of the latest in electronic avigational and landing aids before he can fly the airlift. Co-pilots are mainly radio men on the Vittles run, and the flight engineer must know the radio compass, loop orientation and letdown procedures too.

It is presently the job of the Great Falls, Montana, Air Force Base school to see that crew replacements for Vittles meet Air Force requirements. Looking in on them one is reminded of the assembly line efficiency of wartime training. The urgency is there again.

Most of the pilot candidates for Vittles coming in to Great Falls have had dual or multi-engine flying, so that for them Great Falls is a sort of post-graduate course. But each of them has to have had at least 1,200 flying hours, 50 of which have been on instruments, before he can even start his special training as a Vittles replacement. In fact, to fly in the Berlin airlift he has to meet more rigid pilot requirements than the CAA demands of airline pilots.



An interesting innovation in Link trainers at the Great Falls, Montana, Air Force Base where pilot replacements for Vittles are being trained. Five or seven trainers are hooked up to one master control operator who governs their take-off times, altitude and let-down procedures. Here the controller marks on his control board the location and altitudes of five planes in the simulated corridor as they call in over the check points on the way to Berlin.

At Great Falls he is pushed through 165 hours of ground, Link, and flying time to regain what he might have forgotten or lost in a period away from aircraft. No matter what his background he gets the works at Great Falls in the way of schooling.

Much of the Great Falls training is the usual ground schooling which includes every mechanical movement in a flying airplane. Those are essentials which haven't changed much. There has been change, however, in electronic avigational and landing aids, and in their application. The Great Falls ground school has adapted its training to these advancements, in some cases with considerable ingeniousness.

Student pilots of the Vittles RTC at Great Falls, Montana study the radar flight simulator as a part of their aviation training. As the scale size radar antenna moves slowly over the relief map of the Berlin area, the images of cities, rivers, mountains and other terrain features appear on the radar scope as splotches.

Vittles Pattern Used

The whole pattern of replacement training at Great Falls is determined by the need for airplane crews' familiarity with the procedures of the Berlin airlift. In the flight phase of the school pilots fly the same type of airplane with the same weight load, fly the same pattern, make landings of a run equal to the Berlin runways' length.

In the ground school this pattern is followed in avigation study too. Most impressive innovation in this is the "tying together" of five or seven Link trainers. By this clever arrangement five or seven pilots can sit in the school's Link trainer room and "fly" the Berlin corridor just as they would actually make the flight, one after the other, in three or four minute intervals. Control towers, check points, and GCA landings are simulated on the "flight."

A pilot, if he is accepted for training at Great Falls, and finishes the training, is flying the Vittles run approximately a month after he started his special training at the replacement training center. His training period requires three weeks. The first week is devoted to ground instruction on such subjects as the airplane in general (the C-54, in this case), hydraulic systems, electrical systems, fuel and oil, engines, code practice, etc. The second week the student begins flying. His flights, each of three hours duration, are made every other day during the second and third weeks. Ground school is continued throughout the second and third weeks during the periods in between flights.

If you've been in service you at first get the feeling, as you look in on the Great Falls replacement training unit school, that you are back in again. There is that about it which is so typical of intensive service schooling to produce trained men in a hurry.

But, as there was in the emergency of the wartime period, so there is the urgency now. And when you examine the innovations, the technique, of the concentrated training being accomplished at the Great Falls Air Force Base, you cannot help but take pride in that efficiency which is so characteristically American.

Defense planners assume that any future attack on the United States will be a repetition of the Pearl Harbor method, but will be made on the mainland . . .

INDUSTRY DISPERSAL FOR SECURITY

There is no known military defense against the atomic bomb itself except space. There is and will continue to be defense against any carrier which a potential enemy might use to deliver such a bomb. This defense alone is not sufficient.

The constantly increasing range of aircraft, together with the enormous destructive capacity of atomic weapons, makes it reasonable to assume that within the foreseeable future no area in the United States will be immune from possible attack because of its location alone. This assumption, coupled with the knowledge that the destruction or immobilization of a nation's vital industry will destroy its capacity to defend itself, makes it reasonable to assume that highly concentrated areas of vital industry and population will be the most attractive targets.

The risk of a sneak or unconventional attack becomes great because of the formidable and possibly decisive advantage which could accrue to a powerful enemy in modern warfare by choosing the time, place, and mode of attack. An enemy powerful enough to attack us might conceivably attempt a surprise attack having destructive effects many times those of Pearl Harbor. Sabotage and other methods of destruction would probably be attempted in an effort to prevent effective industrial mobilization for retaliation. Atomic bombs could be delivered simultaneously by plane against strategic industrial targets and by ship against our vulnerable ports.

Thus, it can be seen how location of industry assumes major proportions strategically. It further becomes evident that time is of the essence in establishing at least a pattern of location which will be strategically sound and which can be consistently followed.

Modern strategy presents these problems: Can industry, through location or relocation, achieve a reasonable degree of security if faced with the reality of the risks outlined above? Is it feasible? The answer to both of these questions is that dispersion of industry will go a long way toward combating a potential enemy's effort to cripple our industrial capacity by any mode of attack, conventional or otherwise. The security provided by industrial dispersion becomes more apparent when we measure the significance of modern strategy in terms of its possible application by a potential enemy.

. . . in the manner of the sudden devastation of Hiroshima.

What Can an Enemy Do

Any aggressor nation planning to use atomic weapons will be faced with the problem of the number of atomic weapons that he could make available. This is an important basis for measuring an enemy's capacity for destruction. Assuming an enemy has, and can deliver, the atomic bomb, there remains another basic problem of how many he can make available. Atomic bombs are expensive. The essential fissionable elements—uranium and plutonium—are scarce materials. Any aggressor nation must, therefore, assess a target in terms of the amount of fissionable material it is considered profitable to allocate to its destruction. This means each target must be assessed in terms of its essentiality to the aggressed nation's war-making capacity.

There is the additional factor of the expense of bomb delivery. It will probably continue to be practically axiomatic that as range increases, relative payload decreases, and costliness in proportion to damage becomes greater. To this must be added whatever loss may be incurred in delivery through active interception.

Thus, although modern strategy is based upon the fact that any area of this country can be attacked, the staggering cost in material and energy of such an extensive attack would require that it be planned so as to accomplish the maximum damage to our production facilities.

Factors in Relocation

With this background, it is possible to develop a few general rules in considering strategic industrial location or relocation. The scarcity of the essential materials for the manufacture of an atomic bomb makes production so costly that we may reasonably assume that no country in the foreseeable future will ever have enough to afford to use one on each

city of as few as 50,000 people, or on a congested industrial area of less than five square miles. It is, therefore, strategically desirable to plan industrial expansion so that further urban concentrations of more than 50,000 people may be avoided.

Atomic bombs exploded to date have destroyed almost everything within a one-half-mile radius of the zero point. Beyond the periphery of this first area, and extending to a distance for about one and one-half miles, they caused moderate damage to all structures. Allowing for future developments, it is not expected that an improved bomb would cause heavy damage beyond a distance of three miles from point of detonation. The possibility of a super bomb that will wipe out an entire state is too remote to warrant serious consideration.

Before evaluating present plant locations or proposed plans for relocation or expansion in terms of relative security or vulnerability in the event of attack, let us review and enumerate those implications of modern strategy and knowledge of modern weapons which make plant location of strategic importance, and establish the framework for our thinking in connection with this problem:

(1) Any attack upon the United States will be designed to cripple vital industry as a means of destroying our capacity for successful defense;

(2) Any such attack may be expected to be made suddenly and to be of such magnitude that general destruction in the areas affected can be assumed;

(3) The only lead time we can depend on is that required by a potential enemy to produce and be able to deliver atomic bombs, plus whatever time may be obtained by diplomacy;

(4) The present geographical location of any facility in the United States cannot be considered safe simply because of its remoteness from a potential enemy (although there are, of course, degrees of vulnerability);

(5) A high concentration of industry or population in a given area constitutes the best target for atomic or other modern weapons;

(6) Attack upon areas of industry concentration less than five square miles or urban concentrations of less than 50,000 people will probably not be economically feasible unless they contain specific installation of decisive importance to the nation's capacity for defense;

(7) A location less than three miles from a potential target center of an atomic bomb is seriously vulnerable.

Evaluation of Present Location

The strategic planner of a potential enemy, in appraising the area in which your facilities are located, will be looking for certain objectives. It may be that your facilities are not the particular target he is seeking, but if there are others in the area that he has earmarked for destruction, the net results for you are the same. Here is a list of the kinds of facilities in which he would be most likely interested in a given area:

(1) An individual plant, producing a large percentage of a highly critical item, which, if destroyed, would have immediate far-reaching adverse effects on the production of that and other related items;

(2) All major developments, industrial or otherwise, which could be considered highly inflammable or explosive to the extent that their general destruction would substantially endanger other vital resources in the area. This would include such things as oil refineries, oil storage facilities, paint and chemical plants;

(3) Public utilities such as power plants and water systems which service a general industrial area producing important quantities of essential war materials;

(4) Railway, water, and other transportation facilities serving the area;

(5) Key establishments of the Armed Forces;

(6) Dams and related works and bridges;

(7) Major air bases and air supply centers;

(8) Several plants all engaged in the production of related items of military importance or materials, such as trucks and steel.

Some Yardsticks

It is suggested that the problem of assessing the vulnerability of your facilities be approached in the following manner:

Draw a *three-mile radius circle* about the periphery of your present facilities. Then, in the light of the possible objectives just outlined, list everything within this circle which you believe would be of interest to the strategic planner of a potential enemy. It may not be possible to interpret exactly the kind of items which other plants within the encircled area would make during wartime, and the relative strategic value of such items to the war effort. However, with the general information available to you, some fairly close approximations can be made. The net result of this study will be a basis for several kinds of determinations that then need to be made.

Entrance to German factory found about two miles underground near Thil, France. Defense planners claim underground installations are not practical.

First, in considering your production, think in terms of both peacetime and wartime conditions to determine whether your facilities might be or become a major military objective. This, in many instances, is comparatively easy to determine. A large aircraft plant, a shipyard, a large aluminum plant, each obviously could well become very important to an enemy. Generally, prime contractors for the production of war materials, in varying degrees of importance, could consider themselves in this class. Certain basic material plants and many component plants also would be included. It is not necessary to be a military expert to have a fairly good idea of the importance of your production in a war effort.

In making this determination, the size of your facilities and others within the area concerned should not be the sole influence in your decision. A small instrument plant, for instance, might be highly critical and the object of much attention from the strategic planner. Likewise, the fact that your industry is a heavy or a light industry has little bearing. The real determining factors are the actual use our military forces will make of the items produced, and the amounts of such items which are

available in the proper places at a given time, as compared with the actual requirements, and the possibilities for employing substitutes. From this inquiry, you should be able to estimate whether or not, at some future critical moment, the enemy strategic planner might consider your facilities, or the area in which they are located, as a major objective. Even if you believe your facilities alone would not be classed as a primary objective, the existence of any other facilities within this three-mile radius, which could be so classified, is as much a matter of your concern as if your own facilities were directly involved.

A further inquiry into your facilities may show that all of them are not necessarily attractive targets. It may be that only a single unit, if destroyed, would result in a 100 percent stoppage of production for several months. This might be adequate to the needs of the enemy strategic planner. This means that all such units should be identified if you are to have a complete picture. While, of course, no attempt is likely to be made to knock out a single plant with an atomic bomb, conventional bombing techniques have improved to a point where such destruction is easily possible.

As a result of your investigation, you should be able to conclude for strategic vulnerability reasons, the following:

(*a*) Whether all of your facilities should be relocated in some other general area, or

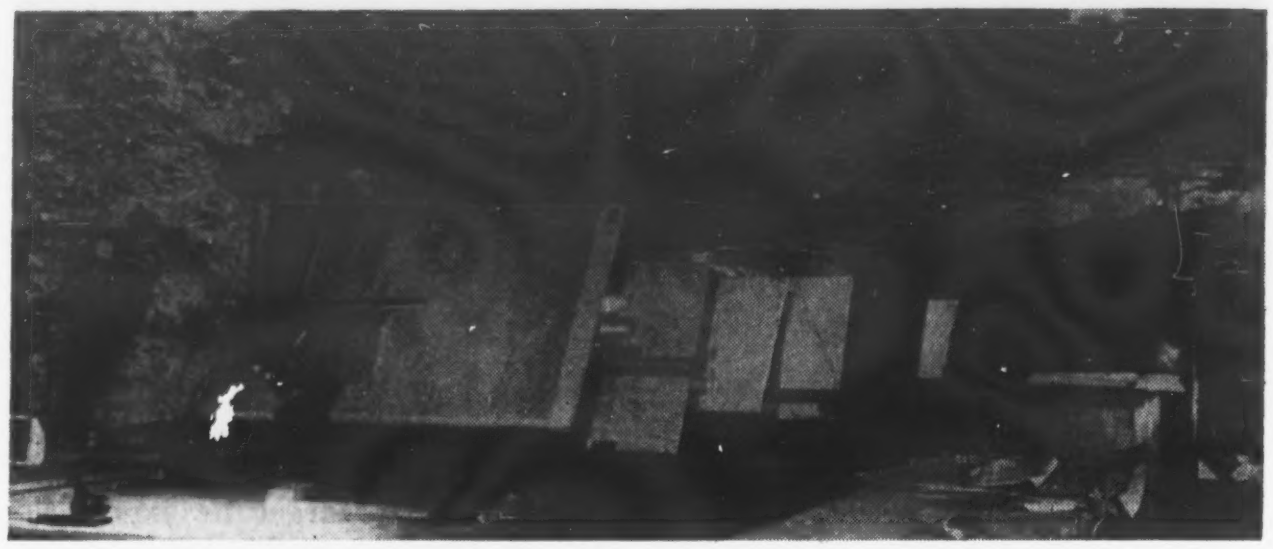
(*b*) Whether part of your facilities should be relocated, or

(*c*) Whether no further expansion should be attempted in the present area.

You May Be Surprised

An appraisal of the relative strategic position of your plant installations employing the guide rule described may produce seemingly startling results. If removal of part or all of your facilities is indicated, it is not recommended this be attempted at once. This probably would not be economically practical. Moreover, this would give rise to many allied problems which must be resolved. It is suggested, however, that any expansion of facilities in a location with a substantial degree of vulnerability be avoided.

It is also suggested that efforts be directed to the development of a progressive dispersion plan built around normal expansion and obsolescence factors. In short, any solution to this problem must be economically feasible. A program of this type must of necessity fit into long-range planning. The important thing is to devote study and efforts with a view to making the earliest possible start toward dispersion as the means of achieving a reasonable degree of plant security.



Drafting boards in underground factory, Mosbach, Germany. The factory produced aircraft engines, had 16,000 feet of floor space.

Selecting New Plant Locations

Studies made to date indicate that areas of industry concentration less than five square miles, or urban concentrations of less than 50,000 people, separated by about 10 miles of relatively open country, will be reasonably secure from attack under all circumstances expected to prevail. These factors may be employed as a yardstick in evaluating prospective sites, although, admittedly, such thumb-rules tend to oversimplify the problem.

Among other things, your thinking should be projected in terms of the probable growth or forseeable developments in the prospective area which may make it strategically vulnerable. It should also be borne in mind that the location of one industry in a community normally influences growth of other dependent or allied industries and services. General trends in population movement must also be given proper weight.

In this connection, topographical features of terrain become significant. In World War II, Hiroshima and Nagasaki were chosen as targets for the atomic bomb because of their strategic concentration of industrial activities. Deaths in Nagasaki, however, despite its greater population density, were only one-half those at Hiroshima. Topography was the major factor in accounting for this difference. Ridges of hills separated areas of Nagasaki into dispersed built-up pockets, whereas Hiroshima was relatively flat and uniformly concentrated. The Nagasaki bomb thus dissipated much of its energy against hills and unoccupied area, while the Hiroshima bomb achieved its most devastating effect.

Industry fared better in Hiroshima. All major factories were reasonably well dispersed and escaped serious damaged. At Nagasaki, plants and dockyards at the southern end of the city were left intact, but those concentrated in the valley where the bomb exploded were almost completely destroyed.

It is fully recognized, of course, that a fundamental requirement in any survey of an area for selection of a location is that it be economically feasible to the particular industry concerned. With few exceptions, however, economic advantage and relative strategic safety will not be incompatible.

Some of the basic factors governing the economic evaluation of plant locations are:

1. Location of production materials.
2. Labor.
3. Sites.
4. Industrial fuel.
5. Transportation facilities.
6. Market.
7. Distribution facilities.
8. Power and water.
9. Living conditions.
10. Laws and regulations.
11. Tax structure.
12. Climate.

All industries are dependent in some degree upon one or more of these factors in evaluating prospective locations. Industries least dependent upon these requirements for economic advantage will have the maximum latitude in site selection. Some, by the same token, will have little latitude.

When a comprehensive survey of prospective locations has been made, it is probable that several will be found to be economically practical. Your problem then becomes one of selecting the location which is stra-

tegically most desirable, employing the factors previously described.

Dispersed vs Underground Locations

Adequate dispersion is the most practical solution to the problem of strategic location.

Any solution must reflect a judicious balance between economic feasibility and reasonable strategic security. Dispersion by and large meets these requirements.

Underground installations, although probably providing maximum protection, are not thought practical for application on a large scale. Among other things, they generally entail higher construction costs. This is also true of special construction of above ground facilities, employing fire, blast, or radiation resistant materials. Resort to this type of security will probably be economically justifiable only in connection with such highly strategic facilities as may be determined by the Armed Forces.

Dispersion—Product and Plant

In planning for the development of a dispersion plan for your industry, an attempt should be made to disperse not only a maximum number of your manufacturing installations, but also the manufacture of individual products. In short, such a plan should be as broad as practicable, both plant-wise and product-wise, and designed to minimize interdependence; or stated another way, to achieve maximum self-sufficiency.

The degree of latitude in achieving product and plant dispersion, just as with geographic location, will of course vary with each industry.

Trends Already Visible

Decentralization of population and industry is actually taking place. A host of pressures is at work in this direction.

The National Industrial Conference Board in its study, "Decentralization of Industry," states:

"There is a trend toward locating manufacturing plants in the smaller cities and towns. Cities and towns with 10,000 to 100,000 population are reported to be the most popular places for plants established from 1940-1947. Only one-third of the plants built or acquired since 1940 are in cities of 100,000 and over. For plants established prior to 1940, close to half were in cities of that size. On the other hand, almost 30 percent of the plants established since 1940 are in towns of 10,000 or less, against only 20 percent of the plants built before 1940."

Drill press bay in an underground V-1 factory in France. The factory employed 8,000 workers. Its site was an old iron mine.

Trends toward decentralization of industry and population are significant for several reasons. Each of these trends influences the further development of the other: Markets grow up in new areas. They in turn attract industry. New industry gives rise to new pools of highly skilled labor. This cycle of action and reaction sets up a benign circle.

Many industries are very dependent upon skilled labor, which is normally thought to be relatively immobile. Further developments in decentralization of population plus the growing development in simplified manufacturing techniques, semiautomatic machine tools, etc., go far toward reducing dependence upon localized supply of highly skilled labor. To these factors should be added the incentive to movement that can be created for workers in the form of better working and living conditions.

It may also be anticipated that agencies lending money for long-range capital expenditures will give thought to location as a risk factor. Thus, decentralization may be given further impetus.

These are a few of the many factors bearing a relation to the relocation problem. They indicate the broad outlines of a potential pattern of industry and population which, if properly guided, will result in substantial benefits to both.

It remains industry's problem to take maximum advantage of this pattern to insure that new plants are located with a view to maximum security. The fact that your particular facilities are decentralized is not sufficient if the bulk of your installations, although dispersed, are located in highly vulnerable areas.

Conclusions

The whole problem of industrial dispersion boils down to a common-sense application of the old adage about not putting all of one's eggs in one basket.

Whatever future technological advances may take place in the art of waging war, there will always remain the fundamental principle that the advantage sought in any strategic objective must be weighed against the cost of attaining it, in terms of energy and materials. It is also true that as the destructive effects of modern weapons increase, so does their cost. Such weapons — whether they be atomic, chemical, bacteriological, or any other diabolical engine of destruction that may be further developed in the foreseeable future—cannot be expended prodigally unless the risk is calculated to bring commensurate results.

If the industrial facilities of the United States were effectively dispersed, that fact alone would make an incalculable contribution toward the maintenance of peace because of the prohibitive expense of any enemy attempt to destroy this country's ability to defend iteself. Dispersion could contribute significantly toward outlawing war.

The job of dispersion is one that industry must assume, for both its own protection and that of the national security. Ours being a democratic Nation dedicated to the principles of free enterprise, the Government can neither dictate nor finance such a large-scale change in the industrial pattern. While the Government is naturally concerned with the promotion of a healthy condition in private enterprise, it also has a primary concern for the security of the Nation as a whole.

As technological developments advance to meet changing conditions in the rapid unfolding of world events, many of the problems which now appear nebulous are certain to come into sharper focus. Effective solutions to these problems will be vastly facilitated by the combined and cooperative efforts of industry and Government.

On the job training goes on constantly in Japan, with special emphasis on language lessons for switchboard operators, some of whom know only the fundamental English words required in handling calls

FIFTH AIR FORCE COMMUNICATIONS IN JAPAN

By Jean Stewart

Public Information Office, Fifth Air Force Hq.

In America when you lift a telephone receiver you "listen for the dial tone"—or if you do not have a dial phone you expect to hear "the voice with a smile." In post-war Japan you're lucky to hear any sound at all through your receiver.

During the war, when the B-29's were making their devastating bomb runs on the Japanese homeland, main telephone exchanges went up in smoke along with the aircraft plants and oil refineries, for communications were vital targets. Then with the end of the war there fell to the American signal services the staggering task of rehabilitating the communications systems of the larger Japanese cities. Not only did civilian telephone service have to be restored, but there was to be the added load of servicing the occupation forces with their heavy communications traffic.

The occupation units' communications came first, requiring a vast network to link all installations. For example, the Fifth Air Force had to have constant telephone service between headquarters in Nagoya, on the main Japanese island of Honshu, and its bases located throughout Japan and southern Korea. Using the Japanese telephone system as a basis, the men of communications set out to build a working organization for military use.

Nagoya Exchange Rebuilt

The telephone system in Japan is divided into operating bureaus, each responsible for a designated area. The Nagoya Bureau, under the command jurisdiction of Fifth Air Force

Security Note:

You two are Never Alone On an Oriental Phone

Antiquated pre-war Japanese telephone system requires constant repair. Linemen are shown at work on cable outside Yamato Building, Fifth Air Force Hq, in Nagoya.

Headquarters, is responsible for the area within Aichi, Mie, and Gifu Prefectures on the southern coast of Honshu.

Most telephone equipment used by the occupation is requisitioned from the Japanese telephone system on a lease basis. In Nagoya 1,107 lines have been leased, enough to make a cable 1,000 miles long. But the use of Japanese lines and equipment involves problems not usually confronted in military communications.

Many of the main trunk lines were bombed out and have not yet been restored. Before the war, eight dial exchanges operated in Nagoya. Three of these were completely demolished, and one was partially destroyed, by bombing. Since the war ended the partially destroyed exchange has been rebuilt and service resumed.

All Equipment Pre-War

Even today lines are plagued with delayed attacks of shrapnel. Bomb fragments, lodged in the outer coating of cables, work down into the lines causing circuits to short out unexpectedly. In addition the entire Japanese system is suffering from chronic old age. The equipment, now operating with overloaded lines, is of three brands—all pre-1941 vintage.

One of the first objectives of occupation communication authorities was to introduce preventive maintenance procedures into the Japanese telephone system. The prevailing method in Japan had been to use equipment until a complete and final breakdown. But by carrying on a constant repair program the Japanese are now eliminating many minor difficulties before they lead to major breakdowns. The result is more efficient telephone service for both occupation forces and the Japanese people.

The majority of the telephone operators, repairmen, and linemen are Japanese, with American military personnel as supervisors. On-the-job training goes on constantly with special emphasis on language lessons for switchboard operators, some of whom know only the fundamental English words required in handling calls.

Today security is an important issue involved in using the Japanese telephone system. As one communications officer remarked, "We could not maintain a number one security classification if we posted a guard at every switchboard and on every hundred yards of telephone line." One approach to the security problem is a program of education for occupation personnel, stressing that restricted and confidential information must not be discussed in telephone conversations. The Fifth Air Force Staff Intelligence Section, which constantly reminds personnel to guard their telephone conversations, published the following rhyme recently: "You two are never alone on an Oriental phone."

Nerve center of Fifth Air Force communications is in the headquarters building in Nagoya.

Steady Progress

Although Americans lose patience when there are delays in placing long distance calls and tempers flare when connections are bro' en, today's military telephone facilities reflect a steady record of progress. Old and new problems allow no peace for the men of communications; but with the cooperation of the Japanese in restoring local lines and equipment and through the use of radio circuits to supplement land lines, they have succeeded in developing an efficient telephone system for the occupation forces. By dialing 110 in Nagoya, Fifth Air Force Headquarters personnel can talk to personnel at Kimpo, Korea. . .an air base on the southern Japanese island of Kyushu. . .or any of the myriad of military installations in Tokoyo.

COMMUNICATIONS IN AN AIR-GROUND EXERCISE

Early last year the field exercise "Assembly" was held at Camp Campbell, Ky. Air forces and ground forces combined as a joint task force with the emphasis on airborne operations. The story of the communications planning and operation is told here.

While this article discusses principally the communications for Exercise Assembly, some of the background and overall operation of the exercise is presented for a better understanding of the communications problems encountered.

The plans for Exercise Assembly were received at V Corps Headquarters, Fort Bragg, on 19 January 1948. These plans contained the basic outline of the operation to be accomplished, a list of units to participate, and the necessary administrative and logistical directions.

From this basic plan the V Corps staff developed a detailed plan including a task force staff. This staff was to be manned by the assignment of V Corps officers, Air Force officers from the 9th and 12th Air Forces and Tactical Air Command, and Reserve and National Guard officers who were to be ordered to duty for a period of thirty to forty-five days.

The mission of the joint staff was to:

(a) Practice planning and coordination for, and actual movement of a task force to a selected area to meet or forestall an emergency. First considerations were to be airborne, air-transportable, and air-supply operations, with alternate planning for overland movement.

(b) Afford the utmost practicable field training under simulated combat conditions for task force units, stressing airborne operations.

The exercise was to be divided into three phases:

(1) *Assault Phase,* consisting of the air drop, the air landing, and the securing of the Camp Campbell airstrip.

(2) *Training Phase,* consisting of small unit and specialist training for all arms and services.

(3) *Final Assault Phase,* consisting of the assault and ultimate destruction of aggressor forces.

Staff Setup

In accordance with this detailed plan, the task force headquarters was split into two separate headquarters. The first, a relatively small organization, consisted of the task force commander, deputy commander, chief of staff, the J-1, 2, 3, & 4, signal officer, engineer officer, and a headquarters company. This headquarters was operational insofar as the J-2 and J-3 were concerned. However, in general, it was mainly a policy-making and planning headquarters and was not capable of operating in the field without the assistance of the second headquarters, a larger and more complete headquarters, wherein all of the operations of the special staff as well as the administrative work of the entire headquarters were performed. The first headquarters was called Task Force Headquarters (JTF) and the second headquarters was called the Joint Administrative Command (JAC). The JAC headquarters was given the mission of doing the actual pick and shovel work and carrying out the policies and plans of the joint task force headquarters.

The mission of TF Lucky was to establish, by an impressive and timely show of force, an air head at Camp Campbell, thereby breaking the siege of the Camp Campbell garrison and securing a base for defensive operations against an expected airborne attack by aggressor forces. This was to be accomplished by an airborne drop of one or two regimental combat teams of the 82d Airborne Division, and was to be supported by air-transportable and air-supply operations, and rapid concentration of troops and supplies by motor and rail.

Signal Section Mission

The signal section of JAC, whic had as its mission the accomplish ment of the plans passed on to it b the TF signal section, began to a semble at Fort Bragg, N. C. The off cers from other stations assigned t the signal sections studied the plan already made in order to bring them selves up to date. These plans ha been made by the V Corps signal sec tion and included an estimate of th communications nets and the addi tional equipment that would be need ed. Requisitions for equipment an supplies over those on T/O & E ha been submitted in March. Each un was to leave its home station wit thirty days supply of expendable Active maneuvers and an air-drop b part of the 82d Airborne Divisio however, would result in addition losses which had to be taken into co sideration. The signal units ori inally assigned to the exercise provi ed sufficient signal personnel to i stall adequate communications f the exercise if at full strength an trained. But as plans progressed became evident that the signal troo could not possibly arrive in the m neuver area at full strength or ful trained. Because of this situation recommendation was made to th Third Army to include certain add tional Signal Corps specialists fro the 51st Signal Operations Battalio As a result, a portion of the 51st w secured to assist in installing an maintaining communications in th exercise.

Since the task force staffs had ju assembled and the personnel we from widely scattered organizatio

Communications section of Joint Administrative Command, Exercise Assembly.

cluding the Reserves, a CPX, to last bout 10 days, was planned to pro-ide a "shake-down" for all person-el. The CPX opened at Fort Bragg, nd all major headquarters which ere to participate in field exercise ssembly were organized and became perational. Some of the signal com-unications between these headquar-rs were handled by the post signal ystem.

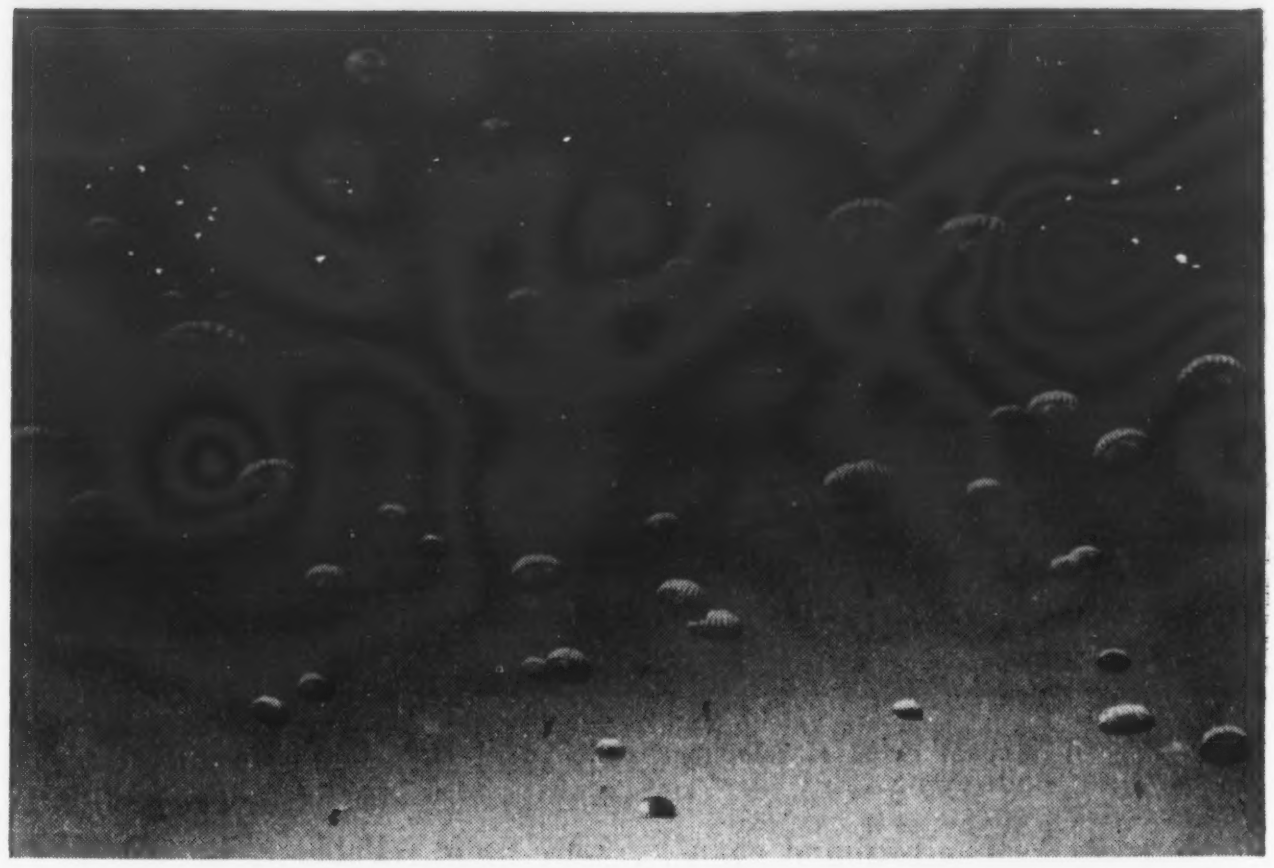
Problems

Because of the proximity of the ajor headquarters (TF, JAC, and Corps were all in adjacent build-gs) the type of traffic load was un-al. Furthermore, as the V Corps eadquarters personnel, who inciden-lly formed the cadre for all three eadquarters, were also performing eir normal administrative tasks, ere was some confusion in the as-gnment of the work load at times. effect, certain staff officers were earing as many as "three hats" si-ultaneously, depending upon the bs they were occupying at the time. he result was a certain amount of realism in the set-up.

The combination of certain por-ons of the CPX being simulated, d other portions being actual, made spatch and distribution of messages ry difficult and some misdirection th consequent delay in transmission messages resulted in several in-nces. Many errors also existed in e uniformity of message writing, dressing, and handling. This had a ndency to slow down smooth mes-ge center operation and confuse the essage center personnel at times.

From the conclusion of the CPX 24 April until 3 May, signal per-nnel checked the receipt of ship-nts of supply at Camp Campbell, rote the signal annexes, issued the I's, and studied the wire and radio s for the initial phase of the field ercise in order that the operation ght go on as smoothly as possible. is required detailed study and had be closely and continually checked h G-3 inasmuch as any shift in op assignments or missions would r the communications plan.

Since each phase of Exercise As-nbly was to last but a few days and lift was limited, it was necessary to ulate the air landing of some of signal troops. Four officers and ty enlisted men who were to oper-the communications for the Task ce Headquarters were simulated airlanded at 0001 on D plus 2. On plus 1 a signal detachment of 1 cer and 16 men was actually air-ded to operate the signal facilities the advance corps CP. This de-



Mass air drop on Camp Campbell, Ky., for Exercise Assembly. 82nd Airborne Division.

tachment was intentionally kept small as it was not contemplated that the V Corps CP would move prior to the arrival of the land-tail 2 days later, and airlift was at a premium. As a result, V Corps Headquarters became operational with just sufficient signal personnel to operate a static advance CP. However, the situation developed so rapidly that the corps felt it necessary to follow the 82d Division forward and there were insufficient signal personnel and wire-laying equipment to promptly install adequate circuits to the new proposed V Corps CP location. This created some delay in the move of the V Corps CP and greatly overloaded the signal personnel assigned to the mission.

These difficulties demonstrated that in order to provide sound and efficient communications in an initial phase, especially in the higher echelons, sufficient signal personnel should be moved into the area as far in advance of its headquarters as possible in order to get adequate facilities established and to eliminate any operating difficulties which may be encountered in establishing the communications system.

Operating directly under the joint task force was the air task force composed of fighter units and troop carrier units of the 9th Air Force as well as the 502d Tactical Control Group. The air task force headquarters remained at Greenville throughout the first part of the exercise. This caused some initial confusion in communications since it required that additional circuits be established between the air task force at Greenville and the advanced air task force at Smyrna Air Force Base, Smyrna, Tenn., as well as additional circuits from task force headquarters at Camp Campbell to Greenville.

Relay Stations

It was decided to establish a radio link with three relay stations between Smyrna and Greenville Air Force Base for the purpose of telling plots between the tactical air control center at Smyrna and the tactical air control center at the air task force in Greenville. This circuit was established but ran into many difficulties due to the shortage of skilled personnel and the fact that some of the distances between relays were excessive —one being a distance of about one hundred miles. Once the link was established, however, the circuit was fairly dependable except for the teletype circuit, which was inclined to be intermittent due to the long relay distances. Backing up this radio link circuit was an HF RT circuit between Smyrna and Greenville.

The tactical air control center was established at Smyrna and the tactical air direction center at Franklin, Ky. Push-to-talk radio link circuits were established between the two and they also were backed up with an alternate HF circuit. All assignment of aircraft for missions was to be handled at the joint operations center at Smyrna. The aircraft were ordered to scramble from the Smyrna Base and upon becoming airborne would contact the tactical air direction center at Franklin, which, with its radar and VHF communications, would control the flight to the objective which had been agreed upon by the JOC. The installation at Franklin consisted of a large radar set with its attending scopes and its point-to-point link equipment

Terminal strips of telephone switchboard at V Corps Hq.

as well as its VHF air-ground channels.

One circumstance which caused trouble was the fact that the area allotted for the unit was so small that the VHF channels were receiving a power feedback from the radar. This was eliminated by lowering the receiving antenna and raising the transmitter antennae, below and above respectively, the center of the radar beam of energy.

Crystals Shortage

Other difficulties which were encountered by the Air Force personnel in installing its communication system were that alternate FM crystals were not carried into the field with them and it was necessary to borrow them from the ground forces. Too little time had been given to the Air Force for complete planning since the decision to use air forces in the exercise had been made late in the planning phase. Another difficulty was that the designated area for the large number of communications systems required at Smyrna Air Base was much too small. Cross-talk and interference were encountered until the sets were more widely dispersed. Due to the fact that much of the equipment had been airlifted, and that airlift was in short supply, many of the necessary pieces of equipment as well as spares could not be taken. Throughout the whole exercise, a lack of training was evident. Many of the personnel had just reported into the units and were still in a state of basic training in communications. To carry on the exercise at all it had been necessary to shift personnel within squadrons in order to get enough personnel familiar with the equipment to be installed at the many stations. However, with all of the difficulties met, most of the circuits were quite reliable. The one means of communication which gave the least trouble was the air-ground communication, which, of course, is of vital importance in controlling the aircraft and giving the ground forces the support where it is needed when it is needed.

On D Day, one RCT of the 82d Airborne Division was airdropped and airlanded at Camp Campbell. In one of the gliders was an AN/VRC-1 (Jeep mounted VHF and HF radio equipment) with a pilot operator and radio mechanic. This mobile set was to be used by the division to contact aircraft and guide them into the target. Personnel of the air-ground liaison company were airlanded with an SCR 193 in a ¼ ton truck for the air request net. This radio was put on the air and made contact with the JOC at Smyrna. Voice communication was unsatisfactory, but contact was maintained by using CW; consequently the circuit was unable to handle a large volume of traffic. An SCR 499 was airlanded for the division and immediately entered the corps command net contacting the V Corps at Fort Bragg. Since the SCR 193 was not too satisfactory in the air request net, and the SCR 499 was not needed on D plus 1 after V Corps landed at Camp Campbell, the SCR 499 was put in the air request net with but little better results than the SCR 193. Difficulties of operation were later determined to be lack of experience on the part of the operating personnel.

Upon arrival at the air head on D plus 1, the corps signal detachment installed the signal system for the corps headquarters. The SCR 499 reported into the task force command net and wire circuits were laid to the 82d Division and local circuits were laid to the corps staff.

TF Lucky at Fort Bragg closed it signal center at 0530 on D plus 2 an reopened at Camp Campbell at th same time. The CG and his staff along with the J—AC staff arrived a Camp Campbell by air about 070 The signal personnel who had been i a simulated airlanding at 0001 on D plus 2 had installed the switchboar and run lines for the communication of task force headquarters. However little could be done at the JAC headquarters since all of its personnel an equipment were in the land-tail which was not scheduled to arrive unti about D plus 3. The JAC headquarters therefore operated with the minimum of communications until the ar rival of the land-tail on D plus 4, day later than was planned as tactica requirements necessitated putting them in a later serial.

FM Station Interferes

Upon the arrival of the land-tail the over-all and final communication plan was implemented. The radio link with one relay station was in stalled between Camp Campbell and Smyrna Air Base; another one be tween TF Lucky and V Corps an still another between JAC and V Corps. Some difficulty was experienced in the radio link between Camp Campbell and Smyrna due to a 150 watt FM station whose frequency wa very close to the relay frequency thus blocking one portion of the cir cuit. New frequencies were assigned between the relay and Camp Campbell and the radio link became fir on the afternoon of D plus 5. The wire plan was put into effect and cir cuits constructed as had been directed in the signal annex. Since the air task force remained at Greenville, it was necessary to have good communi cations between Task Force Luck and Air Task Force and an MRC radio teletype net was installed be tween the two headquarters as well a the normal CW command net.

The assault troops were having their usual difficulties with the laying of wire along the sides of the road

Jamesway shelters used for signal installations.

Tanks, bulldozers, and heavy equipment seemed always to use the shoulder of the road, where the wire was laid, to make their turns and otherwise maneuver. During the training phase a major interruption occurred when an engineer bulldozer took out all the main wires running between the CP's as well as the umpire circuits. This took a little time to correct and was the cause of an order being issued at task force level that personnel would ride on the outside or on top of high vehicles in order to lift the wires up over them.

During the first phase of the maneuver, although personnel were inexperienced and equipment was lacking, the communications facilities were very satisfactory even though there were some failures. At about D plus 4 most of the problems had been ironed out and practically all circuits were dependable.

Unit of Training

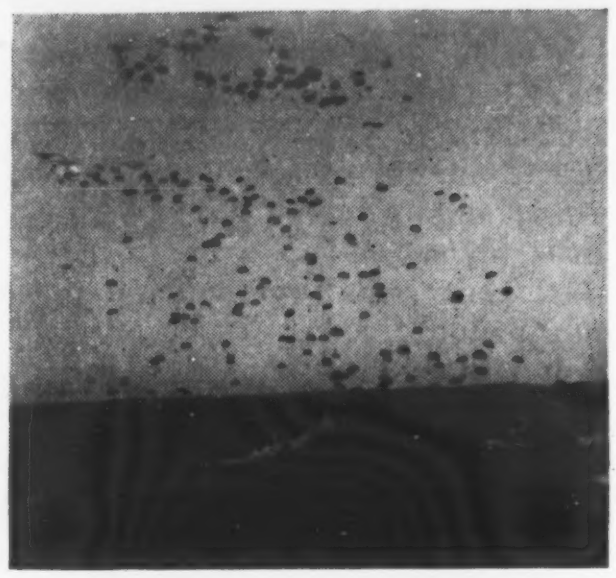
Phase II of the exercise was devoted to unit training and was used to good advantage by signal units. During this period canned messages were transmitted over all radio nets to train operating personnel, wire lines were policed and an RC 120 facsimile school was opened. All communications channels were kept open and used for training and, where needed, additional circuits were installed. A change in plan was also evolved which required the TACC at Smyrna to move to Camp Campbell. Although this made the problem a little unreal it was considered good training, not only for the Air Force personnel, but also for members of the staff of the task force who had not seen a tactical control center in operation. The TADC was to remain at Franklin, Kentucky, and the airplanes were to remain at Smyrna. A skeletonized air task force headquarters was also to move to Camp Campbell. This move required new Air Force channels. The radio link circuit between Smyrna and Greenville was taken out and the equipment moved to Camp Campbell and Franklin, the latter being the relay point for the Air Force circuit between Camp Campbell and Smyrna. This relay point failed to work properly and the relay was moved over to the same site as that occupied by the task force relay between Campbell and Smyrna. During the time this circuit was inoperative, Ground Forces gave one circuit on their AN/TRC circuit to the Air Force for the operational control of aircraft. A radiotelephone HF circuit was installed between Camp Campbell and Greenville which worked very well. From the new TACC at Camp Campbell a push-to-talk radio link with one relay was installed at Franklin since the distance was too great to have solid communications without a relay. The air request net between division, corps, and the JO was reestablished and the air-ground equipment was installed at the JOC. A certain amount of difficulties arose, such as cross-talking and feedback from HF equipment into the FM equipment. This was caused mainly by the fact that again too small an area had been chosen for installing the equipment. After additional dispersion had been made and a change of some frequencies, these difficulties were eliminated.

Facsimile Weather Maps

A radio-teletype link giving weather sequences was also installed at the JOC. This weather information was received from Miami and from Scott Field. In order that weather maps might be available to the personnel of the JOC, a facsimile circuit was set up on the radio link between Task Force Lucky and Smyrna. This equipment turned out sufficient weather maps for the planning of flights as well as giving training to the operating personnel.

The final phase of the maneuver was complicated by the fact that the air task force was required to furnish airplanes for the aggressor forces which meant that the JOC was operating both as a friendly and enemy center. Frequencies in the aircraft were changed and the aggressor air-

Troopers of 82nd Airborne Division load for D Day Jump at exercise.



Paratroopers dropped during exercise.

planes were controlled on the ground by AN/VRS-1's, one of which, along with pilot controllers and radio mechanics, was assigned to each regiment of the 82d Division and one to the aggressor forces. Throughout the third phase of the exercise, requests were made over the air request net from the division to the JOC. These requests for air strikes were approved and the aircraft turned over to the controller of the TACC. Aircraft were ordered to scramble and were immediately contacted by the TACC and turned over to the TADC which was at Franklin. The TADC, using radar and voice control, vectored the aircraft over the area which they were to strike and the control was then taken over by the tactical air direction party (AN/VRC-1) which was stationed on the front lines.

Throughout the exercise it was clearly demonstrated that more actual communications training is needed by both ground and air communication personnel. As the exercise progressed, it was evident that much knowledge and experience had been gained. In addition, the teams and individuals had learned to work together, to realize that the one mission was important to both, that where one could help the other it should be done, and that the success or failure of the whole system was not the responsibility of one, but of all services jointly. Much information was gained by the officers who served on the two signal staffs in working with personnel of the other services and seeing the problems of both the Air Force and of the ground forces in such an operation. Also, actually working in the field, the junior officers who had the work to do in establishing these communications, learned a great deal about their own work as well as the work of the other services. There was every evidence of harmony and of joint operation in the true sense of the word.

ASSOCIATION AFFAIRS

ARMED FORCES COMMUNICATIONS ASSOCIATION

1624 Eye Street, Washington 6, D. C.

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Industry-Army Day

Reminiscent of the first Industry-Army Day in Chicago in 1947 when General Eisenhower delivered an inspiring address to 1500 industrialist-members of the several military associations, was the "cold-war" meeting in Boston, February 4th. In the main ballroom of the Hotel Statler over 1,000 members of the six military associations of the Army services—Communications, Ordnance, Engineers, Quartermaster, Chemical and Transportation—stood at attention as the Army band led the distinguished guests and the colors of the services into the ballroom and onto the dais promptly at 7 P.M. and played the National Anthem. After dinner was over, Mr. Joseph P. Spang, President, Gillette Razor Company, who acted as master of ceremonies, introduced the distinguished guests, including the chiefs of Army technical services or their deputies who had come up from Washington.

Mr. Benjamin F. Fairless, president, U. S. Steel, was then introduced as the speaker for industry. Mr. Fairless emphasized the proven advantages of our democratic American way of life by pointing out that he himself, the son of a coal miner, born in Pigeon Run, Ohio, had risen to the head of the mightiest industrial organization in the world. "If there be in any quarters a disposition to yield to the enchantment of foreign ideologists, socialism or communism, let the tempted call the roll of the nations, appraise their situations and judge the merits to the people of their respective systems by the evidence revealed," he said. Mr. Fairless' announcement that the Nation's steel-making capacity would be increased from 96,000,000 net tons on January 1 this year, to 98, 000,000 by the end of 1950, was heartening to the military preparedness planners and to the entire nation.

Mr. Spang then introduced General Bradley, Army Chief of Staff, as the man who commanded in Europe more than 1,300,000 combat troops—the greatest number ever to serve under a single commander. General Bradley warned that the United States cannot count on gaining a decisive knockout in the first round by the use of air power alone. Emphasizing that his speech was not an attempt to belittle the importance of airpower which he indicated is our first line of defense when he stated that "the threat of instant retaliation through an air offensive is our greatest deterrent to war today," he nevertheless added that he is convinced that no matter how crippling air attack can be, we would be forced to gain the final victory over the dead bodies of our soldiers on the ground.

"In the creation of a sound military force for the armed defense of the nation, there is no place for free competitive enterprise among the separate services in the business of fighting a war.

"Security is a cooperative venture: it is not a competitive race. To forewarn aggressors and to construct effective military might, we are in need of partnership, not partisanship; concern for the safety of this nation, not the survival of our arms.

"Because we insist that every American armchair has a right to its own home grown general, the agreement of our armed forces on a strategic plan for defense is on trial today before a bar of public debate.

"I certainly do not question the right of any American to speak his honest opinion on the fitness of our plans. His is the nation to be defended and his are the taxes that pay the bills.

"And I respect the constitutional right of Congress to make provision as it may judge essential to the nation's safety.

"But as a soldier, entrusted by you with a share of responsibility for the nation's defense, I feel it my duty to speak the truth as I see it, to state my convictions as plainly as I can that you may know my position and that of the Army today.

"If I did not believe that war in the future will still thrust its eventual burden on the soldier who fights on ground, then I would readily recommend abolition of the Army and happily bequeath our missions to any one who would have them.

"To provide long-term security for the nation, our military requirements must be related to American foreign

policy and to the known offensive capabilities of likely enemy states. They must be predicated upon preparedness for a plan of war—a strategy that can defend our shores, aid our allies, and preserve a foothold from which to strike the agressor in his homeland.

"Even in the combined employment of air, naval, and ground arms —war presents a problem of priority and sequence in mounting an offensive against the aggressor's forces and the sources of his strength. To survive, the United States must be prepared instantly to gear its counterattack to a war of increasing violence, a war of growing intensity, and a war of widening global dimensions."

"By reckless reliance upon a knock-out blow in the opening months of a conflict, we might unwittingly risk defeat in war and the possible loss of our lives. Even a champion does not enter the ring until he has trained for the full bout.

"If the Army and Navy were to be denied relative readiness in their striking forces to hold and seize advanced bases, we might easily waste our air strength in an over-extended and therefore far less effective preliminary air war. This could do nothing but lengthen the conflict and multiply its eventual cost.

"By our failure to preserve a foothold for subsequent ground assault, we might have to abandon the promise of help for our allies and discard our hopes for decisive invasion against the enemies' armies.

"For no alliance can be effective anywhere in the world until the United States is ready to deploy its strength immediately in the critical theater of war. And no massive invasion can succeed without a near and friendly base from which we might launch it."

"The Department of National Defense is not irrevocably split—as critics would have you condemn it—among partisans of the several arms. We have made a start in compromising our individual requirements to construct—one with another—a security force that can best fulfill both our instant and eventual needs in the event of war. And we have learned that just as important as step-by-step sequence of fighting in modern war is the fundamental demand for complete unity in word and heart among the armed forces.

"I pledge to you the willingness of the United States Army constantly to review its requirements that you need not be taxed for the maintenance of non-essentials. We do not exist to defend stubborn traditions, obsolete concepts, or yesterday's tactics. We exist to defend the nation, tomorrow as well as today."

The packed ballroom paid tribute to General Bradley as a brilliant and fearless combat soldier and an inspiring peacetime leader, both as Veterans Administrator and as Army Chief of Staff, by standing and applauding and cheering him when he was introduced as well as at the conclusion of his address.

Before the banquet, President Charles Francis Adams, Jr., and Mr. Ray Ellis of the Raytheon Manufacturing Company, had the communications representatives at a cocktail party in the Statler.

Earlier in the day nearly 3,000 gathered in the First Cadet Corps Armory to hear Mr. Gordon Gray, Assistant Secretary of the Army, outline the Army's and the Military Establishment's planning for industrial mobilization. Major General A. C. McAuliffe then addressed the audience on the accomplishments and plans of the National Military Establishment's Research and Development Board of which he is deputy chairman. His presentation made it clear to the audience that the Army is utilizing to the utmost the civilian scientists as a part of the team which must be used for victory in another war. He emphasized the pitifully small appropriations that research and development received before World War II when the entire country was so unmindful of the needs of military preparedness. General McAuliffe was introduced as the commander of the 101st Airborne Division who, when surrounded by the Germans in the Battle of the Bulge, answered a demand for surrender not with "Ja" but with "Nuts!"

General J. Lawton Collins followed with a brilliant presentation, with the aid of colored slides, of the General Staff's estimate of the world situation today and our military position in the situation. All that was said at the afternoon meeting was "off the record."

At 11:00 in the morning the AFCA members and guests gathered at the Copley Plaza to hear a presentation of the industrial mobilization planning situation in the Signal Corps. Colonel Paul Hannah, an officer of AFCA's Boston chapter, presided. Mr. Fred Lack, AFCA national director, Vice President of Western Electric Company and recent lecturer befor the National War College in Washington, outlined in great detail, with the aid of mountains of blueprints, specifications, forms, subcontracts and other papers, the tremendous job of carrying through an Army contract from the bid to delivery of the end item. Colonel Fred W. Kunesh, in charge of industrial mobilization planning for the Signal Corps and chairman of a joint Army-Navy-Air Force committee on such planning for electronics, then outlined the Signal Corps problem and exposed some of the difficulties that slow down progress. Colonel A. M. Shearer, deputy head of the Procurement and Distribution Service, OC SigO, outlined the overall situation on current procurement, distribution and planning for emergency expansion. He described an expected modification in the regulations which will tend to give more manufacturers experience in producing Signal Corps items. Colonel E. F. Hammond, Chief of the Personnel and Training Service, OC SigO, explained in detail the progress being made in forming "affiliated units" and called for assistance from industry in this important activity.

At 12:30 those who had attended the Signal Corps forum assembled for luncheon in the Copley Plaze. Mr. Walter F. Schuchard, President of the Boston Chapter, AFCA, presided. He introduced Major General J. O. Mauborgne, former Chief Signal Officer, and Rear Admiral Joseph R. Redman, wartime Chiel of Naval Communications, and Vice President of Western Union Company and of AFCA's New York Chapter. Admiral Redman outlined Western Union's recently established communications set-up which will be of tremendous value to the Armed Forces in the event of another emergency. Colonel F. W. Wozencraft, AFCA legal counsel, who had come up from Washington, and Colonel George Dixon, President of the New York chapter, were also present as was Colonel Van Ness Philip, AFCA charter life member.

General S. H. Sherrill, Executive Director, AFCA's National Headquarters in Washington, described the purposes of the Association, its progress in its 2½ years' existence, and urged increased activity in all chapters so that we may exercise greater influence for better communications in the three services.

Colonel Kirke B. Lawton, Deputy Chief Signal Officer, who represented General Akin at the meetings, explained the organization and activities of the Office of the Chief Signal Officer and extended greetings to all on behalf of the Chief Signal Officer.

The 1950 Industry-Army Day meeting is expected to be in New Orleans.

Air University

On April 15, General S. H. Sherrill will address the students in the Air Communication and Electronic Staff officers course on the purposes and accomplishments of AFCA. The address will be given at the Special Staff School, Craig Field, Alabama.

CCAFA

At the regular monthly meeting of the Coordinating Committee of Armed Forces Associations on February 15, it was decided to prepare for presentation to the Secretary of the Army, recommendations covering the granting of credits to Reserve personnel for attendance at certain association and chapter meetings which have instructive value. Such an arrangement would be of assistance to members of the civilian components toward earning the necessary credits for retirement or for certificates of capacity.

At the March 15 meeting the guests were Major General Vernon E. Pritchard, New Chief of Army Information, Brigadier General A. Robert Ginsburgh, Air Force Information officer, and Captain Harry E. Sears, Navy Information office.

New Southern Chapters

On April 13, the Executive Director, General S. H. Sherrill will visit Augusta, Georgia and Camp Gordon in connection with the formation of a new AFCA chapter there in the recently established Signal Corps Training Center. The preceding day he will attend a meeting of the Atlanta Chapter. On April 18, he will address a meeting at Columbia, South Carolina at which steps will be taken to form a South Carolina chapter. Mr. W. H. Mansfield, chapter representative for Area C, arranged the meeting, with representatives from the State Capital, Fort Jackson and Greenville Air Force Base.

Mid West Chapters

The Chicago chapter meeting scheduled for February will be held in May in conjunction with the annual radio parts show there. General Sherrill will speak about association matters. Later he will visit the Decatur, Illinois chapter and attend a chapter formation meeting at Detroit.

Invitation to New Members

If you know the name of someone who might be interested in AFCA, please drop us a postcard and we will mail literature to him.

Industrial Minute Men of 1949: Communications & Photography

Listed below are the names of the American firms who are group members of the Armed Forces Communications Association. By their membership they indicate their readiness for their share in industry's part in national security. These firms and their employees are a part of that patriotic group which Secretary Forrestal said is needed so that the armed forces can learn of the most advanced industrial and commercial techniques, and to which they may turn for advice on research, manufacturing, procurement and operation.

Acme Newspictures, Inc.
Admiral Corporation
American Phenolic Corporation
American Steel & Wire Company
American Telephone & Telegraph Co.
American Time Products, Inc.
Anaconda Wire & Cable Company
Arnold Engineering Company
Astatic Corporation
Automatic Electric Company
Automatic Electric Sales Corp.

Baltimore News Post
Baltimore Radio Show, Inc.
Bell Telephone Company of Pa.
Bendix Radio
Bliley Electric Company
Breeze Corporation, Inc.

California Water & Telephone Co.
Capitol Radio Engineering Inst., Inc.
Carolina Telephone & Telegraph Co.
Chesapeake & Potomac Tel. Co.
Chicago Telephone Supply Co.
Cincinnati & Suburban Bell Tel. Co.
Cinch Manufacturing Corp.
Collins Radio Company
Colonial Radio Corp.
Commercial Radio-Sound Corp.
Copperweld Steel Company
Cornell-Dubilier Electric Corp.
Corning Glass Works
Coyne Electrical School, Inc.

DeJur-Amsco Corporation
Diamond State Telephone Co.
Drake Manufacturing Co.
Allen B. DuMont Laboratories, Inc.

Eastman Kodak Company
Hugh H. Eby, Inc.
Thomas A. Edison, Inc.
Electric Storage Battery Co.
Electronic Associates, Inc.
Electronic Designs, Inc.
Emerson Radio & Phonograph Corp.
Espey Manufacturing Co., Inc.

Federal Telephone & Radio Corp.
Freed Radio Corporation

General Aniline & Film Corp.
General Cable Corporation
General Electric Company
General Instrument Corp.
General Precision Equip. Corp. & Subs.
General Telephone Corp.
Gilfillan Bros, Inc.
G'oe Wireless, Ltd.
Graflex, Inc.
Gray Manufacturing Co.

Hallicrafters Company
Haloid Company
Hazeltine Electronics Corp.
Heinemann Electric Company
Hercules Motors Corp.
Hewlett-Packard Company
Hoffman Radio Corp.

Ilex Optical Co.
Illinois Bell Telephone Co.
Indiana Bell Telephone Co.
Indiana Steel & Wire Co.
International Detrola Corp.
International Resistance Co.
International Tel. & Tel. Corp.

Jacobsen Manufacturing Co.

Kellogg Switchboard & Supply Co.

Lasting Products Co.
Leich Sales Corporation
Lnicoln Telephone & Telegraph Co.
Link Radio Corporation

Machlett Laboratories, Inc.
Magnavox Company
P. R. Mallory & Co., Inc.
Massachusetts Radio & Telegraph School
Merit Coil and Transformer Corp.
Michigan Bell Telephone Company
Mines Equipment Company
Mountain State Tel. & Tel. Co.
Mutual Telephone Company

National Carbon Company, Inc.
National Fabricated Products, Inc.
New England Tel. & Tel. Co.
New Jersey Bell Telephone Company
New York Telephone Company
North American Philips Co., Inc.
Northwestern Bell Telephone Co.

Oak Manufacturing Co.
Ohio Bell Telephone Co.
O'Keefe & Merritt Company
Okonite Company
Olin Industries, Inc.
Operadio Manufacturing Company

Pacific Telephone & Telegraph Co.
Philco Corporation

Radiart Corporation
Radio Condenser Company
Radio Corporation of America
RCA Victor Division
Rauland Corporation
Ray-O-Vac Company
Reeves Instrument Corp.

Servo Corporation of America
Sherron Electronics Co.
Sonotone Corporation
Southern Bell Tel. & Tel. Co.
Southern New England Tel. Co.
Southwestern Bell Telephone Co.
Sparks-Withington Company
Sperry Gyroscope Company
Stackpole Carbon Company
Standard Piebo Company
Stewart-Warner Corporation
Stromberg-Carlson Co.
Stupakoff Ceramic & Mfg. Co.
Sylvania Electric Products, Inc.

Telephone Services, Inc.
Teletype Corporation
Time Facsimile Corporation
Tri-State College
Tung-Sol Lamp Work, Inc.
Tyler Commercial College

United Radio Television Institute
United States Elec'ric Mfg. Corp.
United States Rubber Company

Wm. H. Welsh Co., Inc.
West Coast Telephone Company
Western Electric Company, Inc.
Western Union Telegraph Co.
Westinghouse Electric Corp.
Weston Electrical Instrument Corp.
Willard Storage Battery Co.
Wisconsin Telephone Company
Wollensak Optical Company

Chapter News

☆ ☆ ☆ ☆ ☆ **Chapter Of The Year, 1948 — Far East, George I. Back, President** ☆ ☆ ☆ ☆ ☆

National Director of Chapters: **Theodore S. Gary, 1033 W. Van Buren St., Chicago, Ill.**

AREA REPRESENTATIVES FOR CHAPTERS

Area A: **George P. Dixon, IT&T Corp., 67 Broad St., New York, N. Y. New England States, New York, New Jersey**

Area B: **J. H. LaBrum, Packard Building, Philadelphia, Pa. Delaware, Kentucky, Maryland, Ohio, Pennsylvania, West Virginia and Virginia**

Area C: **W. H. Mansfield, So. Bell T&T Co., Atlanta Ga. Southeastern States along Atlantic and Gulf coasts—from North Carolina to Mississippi and including Tennessee**

Area D: **H. L. Reynolds, 1800 N. Market St., Dallas, Tex. New Mexico, Texas, Oklahoma, Arkansas and Louisiana**

Area F: **H. L. Hoffman, 3761 S. Hill St., Los Angeles, Calif. Arizona, Utah, Nevada, California, Idaho, Oregon, Montana and Washington**

Individuals interested in chapter activities should communicate either directly with National Headquarters or with the proper area representative.

CHAPTERS AND SECRETARIES

ATLANTA: **Capt. Mansell A. Walker, Sig. Sec., Hqs, 3rd Army, Ft. McPherson, Ga.**

BALTIMORE: **E. D. Bond, Baltimore Signal Depot, Middle River, Md.**

BOSTON: **Lt. Col. Edmund T. Bullock, Boston Army Base, Boston 10, Mass.**

CHICAGO: **Oliver Read, 185 N. Wabash Av., Chicago, Ill.**

CLEVELAND: **H. E. Schafer, Radiart Corp., 3751 W. 62nd St., Cleveland 2, Ohio.**

DALLAS: **E. H. Mittanck, Rm. 816, Telephone Bldg., Dallas, Tex.**

DAYTON: **Gertrude A. Knight, 54 Patterson Village Dr., Dayton, Ohio.**

DECATUR: **Doris E. Short, 140 No. Hilton St., Decatur, Ill.**

EUROPEAN: **William M. Hart, ICD, OMGH, c/o Radio Frankfurt, APO 757, New York, N. Y.**

FAR EAST: **Maj. C. B. Whittenberg, Sig. Sec., GHQ., FEC, APO 500, c/o PM, San Francisco, Calif.**

FORT MONMOUTH: **Col. William L. Seibert, Squier Signal Laboratory, Fort Monmouth, N. J.**

KENTUCKY: **Clyde T. Burke, Lexington Signal Depot, Lexington, Ky.**

LOUISIANA: **A. Bruce Hay, Southern Bell Tel. & Tel. Co., New Orleans, La.**

NEW YORK: **Col. William H. Harrington, 195 Broadway, New York 7, N. Y.**

OGDEN-SALT LAKE: **Miss Marjorie Hansen, 2227 Adams Ave, Ogden, Utah.**

PHILADELPHIA: **Joseph Bergman, Sig. Corps Stock Control Agency, 2800 So. 20th St., Philadelphia, Pa.**

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SACRAMENTO: **Maj. James A. Board, Sacramento Signal Depot, Sacramento, Calif.**

SAN FRANCISCO: **Capt. John H. Meyer, 1930 Prince St., Berkeley, Calif.**

ST. LOUIS: **A. Reid Chappell, 7478 Stratford St., University City 5, Mo.**

SEATTLE: **Clarence C. Bodine, 6812 Phinney Av., Seattle, Wash.**

SOUTHERN CALIFORNIA: **K. E. Lambert, MGM, Hollywood, Calif.**

SPANISH WAR VETERANS DIVISION: **George A. Marshall, Adj., 215 Montague St., Brooklyn, N. Y.**

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CORNELL: **John M. Ross, 126 McFaddin Hall, Ithaca, N. Y.**

NEW YORK UNIVERSITY: **Robert D. Hawkins, 25 Spruce Ave., Ridgefield Park, N. J.**

OKLAHOMA A & M: **W. D. Manahan, Okla. A & M College, Stillwater, Okla.**

STATE COLLEGE OF WASHINGTON: **Stuart W. McElhenny, 604 California St., Pullman, Wash.**

TEXAS TECH: **Raymond D. Self, Veterans Village, Lubbock, Tex.**

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NATIONAL HEADQUARTERS CHAPTERS SECRETARY: JULIA B. GODFREY

CHAPTERS

Baltimore—F. E. Moran, Pres.

Some one hundred members of the Baltimore chapter and guests met on January 11th at the Locke, Inc., plant, which specializes in insulators for power and radio installations. After dinner in the company cafeteria, President Moran introduced Capt. Paul Dugan and Capt. Richard L. Elliot of the Naval Communications Station in Annapolis, and Col. Arthur Pulsifer, Second Army Signal Officer, who was the first secretary of the chapter. Brig. Gen. S. H. Sherrill, National Executive Director, came over from Washington and reported on developments in other chapters throughout the country.

Lt. Col. C. A. Brown, Assistant to the Chief of the Engineering and Technical Service, OCSigO, described in detail recent accomplishments in the development of communications equipment and projects now under way. Mr. Howard Frey, Chief Development Engineer of Locke, outlined the various operations of the Locke plant, after which the audience was taken on a tour of the plant.

On March 3rd, the chapter distinguished itself by putting on a nationwide broadcast of Maj. General Spencer B. Akin's message to the meeting in commemoration of the 86th anniversary of the Signal Corps. The meeting took place at Station WBAL of Baltimore. At 6:15 P.M., Clinton H. Johnson, Baltimore Chapter member, interviewed Admiral Stone and other distinguished guests on the WBAL Television. At 7:00 P.M., General Akin's message to the country was carried over the NBC

Chapter of the Year

With two months to go, the following were in the lead as of March 1st:

Kentucky
New York
Atlanta
Baltimore
Sacramento

network. Studio accommodations only permitted an audience of 160 at the meeting. The broadcast was followed by a tour through the station and included both TV and standard broadcast facilities.

Boston—W. F. Schuchard, Pres.

The association's participation in the arrangements for Industry-Army Day (reported earlier in this issue) was handled by the Boston chapter. Plans for a membership drive are now being made by the chapter officers.

Cleveland—L. J. Shaffer, Pres.

The recent Cleveland chapter meetings have featured inspection tours of various local facilities. On February 10th members participated in an afternoon inspection tour through the Aircraft Engine Laboratories of the National Advisory Committee for Aeronautics at the Cleveland Municipal Airport.

The March 10th meeting consisted of a tour of the facilities of the Acme Telectronix Division of the Newspaper Enterprise Association Service Incorporated. The primary interest in this program was the preparation and handling of news and transmission of pictures by wire for newspapers.

Decatur—G. V. Miller, Pres.

On November 22nd, the chapter was the guest of Mr. Merrill Lindsay for a tour of his radio station WSOY, Decatur. The tour covered the entire station, from basement to transmitter tower, and was of extreme interest.

Officers were elected for 1949 as follows: President—George V. Miller; Ist Vice-President—Louis L. Thomas; 2nd Vice-President—Glenn S. Cox; Secretary—Doris E. Short; Treasurer—Edward J. McCarthy.

European—C. E. Laurendine, Pres.

A general meeting of the European chapter was held in Frankfurt on February 5th. The membership committee reported on the changes in chapter membership in the past six months, with the total of active members now 234. The publicity committee reported that the "European Chapter Review" would hereafter be issued three times yearly due to publication costs and administrative obstacles, but that the "Review" would be enlarged.

After a report from sub-chapters, a general discussion was held on the re-establishment of sub-chapters and the following locations were agreed upon: (1) Austrian (to replace Vienna), (2) Ansbach Signal School, (3) Bremerhaven, (4) Berlin, (5) Ist Division, (6) Heidelberg, (7) Hanau, (8) Headquarters, Constabulary to combine with Stuttgart, (9) Frankfurt, (10) Munich to combine with Nurnberg, (11) Paris, (12) Wetzlar, (13) Wurzburg, and (14) Wiesbaden.

AFCA's European chapter publishes "Review" in 7" x 10" format, are planning to increase number of pages.

Due to its scope, the European chapter is unable to arrange frequent general meetings. However, its sub-chapters are holding independent meetings such as the following:

Frankfurt/Wiesbaden—These two sub-chapters held a joint meeting to view a demonstration of the teleconference equipment using teleoptican projection. The equipment was an improved model of the original "teleoptican". Following, a film was shown concerning long lines communications in Newfoundland.

Hanau—Maj. R. W. White was elected president, and 1st Sgt. Robert S. Byram secretary-treasurer. Both are members of the 7796th Signal Photo Company. Amateur radio station, sign D4AHE, has been established for the convenience of members and all those interested in radio operations. A twenty position code practice table has been set up for training purposes.

Constabulary Stuttgart—Col. Robert G. H. Meyer was selected to head this sub-chapter. At a recent meeting, the aims and purposes of the association were outlined by Col. Meyer, after which Lt. Col. C. S. Hays, recently president of the Fort Monmouth Chapter, explained the various steps taken to build that chapter.

Far East Chapter—G. I. Back, Pres.

The charter of the Tokyo Post of the Far East chapter was presented by Brig. Gen. Back at the membership meeting of the post on January 25th. A post constitution was adopted and officers were elected as follows: chairman Lt. Col. W. D. Dillinger; Ist vice chairman—Col. R. S. Carter; 2nd vice chairman—Chief W. A. Whaley; secretary—Maj. R. P. Zebley; treasurer—Capt. I. Koss.

Kentucky—M. P. McQuown, Pres.

A dinner meeting was held on January 28th at the Jefferson Davis Inn in Lexington. Officers for 1949 were chosen as follows: Murray P. McQuown, president; Harry Bradshow, Bernard Haefling and Eli Hall, vice presidents; Clyde T. Burke, secretary; Robert Miller, treasurer; and Merrell Whitmer, assistant treasurer.

The speaker of the evening was Major L. C. Taynton of the Armored School, Fort Knox. He described the Army Field Forces cold weather test program during 1946 and 1947 at Fairbanks, Alaska, which he had attended as an observer. He said that all types of field equipment were used and tested during two winters when the temperature averaged from 40 to 63 degrees below zero and, as a result, many improvements were made in Army equipment for combat operations in areas of extreme cold.

The February 18th meeting, held at the Stirrup Cup in Lexington, was in commemoration of the 86th anniversary of the Signal Corps. After the dinner, candles were lighted on a Signal Corps birthday cake, which was cut in traditional style—with a saber—by the past president, Col. William M. Mack, assisted by the new president, Murray P. McQuown.

Lt. Col. Robert H. McAteer of the military department of the University of Kentucky addressed the group on the "Evolution and History of the Signal Corps."

After Col. McAteer's talk, Mr. William Prewitt, a Lexington business man and one of the members of Company B of the 113th Field Signal Battalion, which was organized in Lexington at the start of World War I, gave a very interesting and humor-

Murray P. McQuown, new president of the Kentucky chapter.

ous sketch of the history of the 113th Field Signal Battalion.

The meeting was concluded with the showing of the film "Westward is Bataan".

Louisiana—H. B. Lackey, Pres.

On March 15th, Rear Admiral Earl E. Stone, Chief of Naval Communications, presented the charter to the Louisiana Chapter at its first general meeting. The arrangements being made by chapter officials indicate this will be an outstanding event. Details of the meeting will appear in the next issue.

New York—G. P. Dixon, Pres.

The January 6th meeting of the New York chapter, held jointly with the Atlantic Coast section of the Society of Motion Picture Engineers, took place at the Signal Corps Photographic Center in Long Island City. Col. Charles S. Stodter, commanding officer of the center, arranged an interesting program, which included an inspection trip through the new laboratory and a demonstration of the sound recording facilities and process screen photography in use at the center.

A concrete example of the real meaning of the unification of the armed services was presented to a joint meeting of the New York chapter and the New York Volunteer Reserve Electronic Warfare Company on February 9th. The main meeting room of the historic Seventh Regiment armory was filled to capacity with Army, Navy and Air Force, regular and reserve personnel, as well as representatives of the communications industry in New York.

After opening remarks by chapter president Dixon, Capt. Aubrey Wyckoff, USNR, was introduced as commander of the Naval Reserve unit participating. The chairman then introduced in turn Major General Spencer B. Akin, Chief Signal Officer of the Army; Rear Admiral Earl E. Stone, Chief of Naval Communications; and Major General Francis L. Ankenbrandt, Director of Air Force Communications; each of whom gave a short address concerning communications in his branch of the Service. The talks by the communications chiefs were enthusiastically received. Following the meeting, dinner was served to the largest chapter turnout since the 1947 annual AFCA meeting held in New York.

Among the many well-known men in the communications industry present at the meeting were: Maj. Gen. Harry C. Ingles, Chief Signal Officer of the Army during World War II; Rear Admiral J. R. Redman, Chief of Naval Communications during World War II; Maj. Gen. William H. Harrison, in charge of signal procurement and supply during the past war; Maj. Gen. George Van Deusen, formerly in command of Fort Monmouth; Brig. Gen. Francis H. Lanahan, now in command of Fort Monmouth; Brig. Gen. C. O. Bickelhaupt, Chief of Communications on the Staff of the CSO, ETO, during World War II; Brig. Gen. A. W. Marriner, immediate past president of the New York chapter; Capt. Henry E. Bernstein, USN, Navy Liaison Officer at Fort Monmouth; and Col. Harry LaBrum, National Director of AFCA.

An anniversary celebration of Signal Corps Day is being held on March 16th at Governors Island, with Brig. Gen. Francis H. Lanahan, commanding Fort Monmouth, as the guest of honor. Details will be published in the next issue.

L to R: Dr. Luis W. Alvarez, Professor of Physics, University of California; L. J. Brundige, president of AFCA's Sacramento chapter; and Brig. Gen. C. H. Arnold, Chief P & D Division, OCSigO, at a recent meeting of the Sacramento chapter.

Pittsburgh—F. E. Leib, Pres.

Pittsburgh chapter members attended the January 10th meeting of the Pittsburgh section of the Institute of Radio Engineers, which was devoted to the subject of television. The speaker was Mr. Luther R. Huggler, assistant engineer of transmission, The Bell Telephone Company of Pennsylvania.

The February meeting of the chapter was devoted to problems submitted by the National Advisory Committee. Subjects and discussion leaders were: "Protection of Records of American Communications Systems in the Event of Major Disaster"—John J. McGovern of the Bell Telephone Company of Pennsylvania; and "Procurement—Negotiated Contracts vs. Competitive Bidding"—Sumner W. Dana of the G. C. Murphy Company. A final report on the subject discussed at the November meeting, "Conversion of Industry from Peacetime Operation to Wartime Controls", was presented by E. J. Staubitz of the Blaw Knox Company.

Conference of European chapter of AFCA at EuCom headquarters. A tour of the signal communication center followed the conference, and a banquet the same evening concluded the day's events.

Philadelphia—W. W. Watts, Pres.

The Philadelphia Chapter held a dinner meeting at the Quartermasters officers club on March 3rd to celebrate the 86th anniversary of the Signal Corps. Col. A. M. Shearer, Deputy Chief of Procurement and Distribution Service, OCSigO, was the principal speaker. Brig. Gen. S. H. Sherrill, National Executive Director, was also present and outlined activities of the association and urged the maximum attendance at the forthcoming annual meeting in Washington.

Richmond—E. T. Maben, Pres.

Members of the Richmond chapter met on February 23rd at the Pantree in Richmond. Capt. E. L. Gibson, USAF, Langley Field Communications Center Officer for the Tactical Air Command, was the guest speaker. His subject was "Communications within the Tactical Air Command".

Sacramento—L. J. Brundige, Pres.

On January 5th, the Sacramento chapter held a joint meeting with the Sacramento section of the American Society of Civil Engineers. After dinner President Brundige introduced Brig. Gen. C. H. Arnold, Chief of the Procurement and Distribution Division, OCSigO, who had made the trip west to inspect the Sacramento Signal Depot. General Arnold gave a brief talk on the functioning of the signal supply system and its relationship with AFCA.

The featured speaker was Dr. Luis W. Alvarez, University of California' radar expert, who was recently presented with the Medal of Merit, the nation's highest civilian award, for his development of radar devices used during the past war. Dr. Alvarez delivered an interesting address on the future industrial development of atomic energy.

St. Louis—C. P. Bobe, Pres.

The Mark Twain Hotel was the scene of the St. Louis chapter gathering on January 24th. Officers for 1949 are: C. P. Bobe, president; O. A. Eilers, vice president; A. R. Chappell, secretary-treasurer.

After the dinner meeting, Mr. E. J. Ulm of the American Air Lines presented a color sound movie of northern Europe and England, entitled "Wings to Vikingland".

Seattle—M. F. Kerr, Pres.

Members of the Seattle chapter met on January 25th at the American Legion club. The new officers for 1949 were installed as follows: president—Maurice F. Kerr; 1st vice-president—Ed Mickelson; 2nd vice-president—Ezra T. Pope; secretary—Clarence C. Bodine; Treasurer—John F. Rozanski.

Major Joyce B. James, Alaska Communication System, described the organization and function of the ACS as a military and commercial communication system; and Major G. E. Vitt discussed the formation of an ACS Reserve unit. The chapter's guest at the meeting was Col. Wesley T. Guest, Chief of the Army Communication Division, Washington, D. C.

Southern California—H. W. Hitchcock, Pres.

The Southern California chapter is now meeting regularly on the second Thursday of each month. The January 13th meeting was addressed by Col. Martin Shakeley, of the California National Guard, on the subject of ground defense against atomics. Col. Shakeley commands a brigade charged with the immediate organization of such measures as are feasible for controlling and supervising matters in the case of such an attack. He held a discussion period after his talk which the members felt was of immeasurable value.

The feature speaker for the February 10th meeting was Lt. Col. Ralph A. Pender, who commanded the First Combat Camera Unit with the 15th Air Force and MAAF during the past war. Col. Pender showed pictures made by his unit of the air attacks on Ploesti and discussed problems of aerial photography of this nature.

Big Meeting Shaping Up

As SIGNALS went to press with this issue the AFCA's annual meeting, scheduled for March 28 and 29, was beginning to shape up into what appeared would be the association's most successful meeting.

Advance reservations made it appear that there would be at least 500 members present, all preparations were progressing satisfactorily, and even the weather forecast pointed to near perfect outdoor conditions.

Certainly the Navy, as host to the convention visitors, was bending every effort to provide an impressive display of naval communications and photographic equipment. Two Navy communications ships were already docked at the Naval Gun Factory, in Washington, for examination by AFCA members. They are an amphibious force flagship, the USS *Adirondack* (pictured below); and a "schnorkel" type radar picket submarine, the USS *Requin*. The *Adirondack* is a communications ship, termed an "AGC" in the Navy, and is jam-packed with electronic facilities. It has more than 60 radio transmitters and more than 100 receivers.

Among other Navy installations to be visited, the AFCA convention goers should find the Naval Research Laboratory especially interesting. The principal display there will be a rocket with a television transmitter in its nose.

All in all, at this date it looks like a good show and a good meeting coming up. For those who can't make it, we'll give the full story in the next issue.

The Adirondack, AGC (communications ship) brought into Washington by the Navy for the AFCA convention.

NEWS—SERVICES and INDUSTRY

General

New Congress

In the first issue of SIGNALS, September 1946, we had this to say about Representative Carl Vinson, who is the chairman of the House Armed Services Committee in the 81st Congress.

"If Representative Carl Vinson becomes chairman, it is expected that the Military Establishment will benefit. He has demonstrated in his handling of the Naval Affairs Committee outstanding ability to bring to the floor legislation with the backing of his entire committee and to obtain favorable and speedy action by the House. His leadership has been evident in the great success of the Navy's legislative programs as compared with the difficulties in committee and on the House floor of many essential features of the Army programs."

Since his selection as chairman of the Armed Services Committee Mr. Vinson has already demonstrated a broad and understanding point of view toward the combined services, toward their combined mission, and toward the special problems of each of the services. Recently he emphasized his position when he made the following statement:

"Today more than ever before the United States must be prepared vigilantly to maintain and defend the freedom of our people and of liberty-loving men throughout the world against totalitarian aggression and development. Upon us has fallen the mantle of world leadership and the responsibility, both practical and moral, for insuring the preservation of lasting peace among the nations of the world.

"It therefore behooves all Americans to realize that we must have a military establishment second to none. Our combined Services must be the most efficient military organization in existence, not only in terms of the weapons available but also in terms of the caliber and training of personnel."

The new Congress has an increased number of war veterans, both in the Senate and in the House. Newly compiled statistics reveal that 48 Senators and 218 members of the House of Representatives have had service in the armed forces. This means that half of the membership of each house are veterans and will have a special understanding of the needs of a strong Military Establishment and of special legislation to strengthen our military preparedness position.

House Committee on Appropriations

The important House Committee on Appropriations will have as its members, Democratic Representatives Mahon, Sheppard and Sikes, and Republican Representatives Engel and Plumley. Mr. Mahon, the chairman, has had many years of experience on military appropriations, understands them thoroughly and is appreciative of the need for a strong Military Establishment and ample funds to create it. He is one of the ablest young leaders of the House.

Achievements of Communications Branches of Armed Services Toward Unification Cited By Secretary of Defense Forrestal

Sounding the keynote that the greatest guarantee of peace for the United States is in its military strength and "the greater our ability to defend ourselves, the less likelihood that we or the free peoples throughout the world will be attacked," Secretary of Defense James Forrestal in his first annual report as head of the National Military Establishment Dec. 30 brought out succinctly a number of the achievements of the communications branches of the armed services in unification of operations, procurement requirements and research. The relationships of industry in the mobilization planning and preparedness have been most fruitful of progress, it was also cited by the Secretary of Defense.

Secretary Forrestal's review of the past year's activities specifically pointed to the substantial contributions of a number of leading telephone executives in occupying important-posts in his establishment's organizations and in committee work to iron out problems of the armed services.

Alaskan Communications, Amateur Radio Participation Legislation

The work of the Welfare and Recreation Civilian Committee which considered measures for facilitating the best possible welfare and recreation program in event of a future mobilization and the evaluation of the present program was also summarized by the Secretary of Defense in his report. He cited that members of the committee included Cleo F. Craig, Vice President of the A.T.&T., and Arthur W. Page, retired A.T.&T. Vice President and now consultant on public relations policies. The report noted that Mr. Page had headed the Joint Army-Navy Committee on Welfare and Recreation in World War II and had been a top consultant to former Secretary of War Stimson.

Among legislative recommendations submitted to Congress in the first annual report of Secretary Forrestal was the proposal of a bill to authorize the Secretary of the Army to construct and equip a communications system in Alaska to expand the present system operated by the Signal Corps. The Department of the Army also will submit legislation authorizing the Army Signal Corps, Air Force Communications and Naval Communications to set up radio systems on military frequencies into which can be drawn amateur radio operators for an emergency communication system in case of disaster or enemy attack. Another proposed legislative measure will be to authorize the Army Transport Service to transmit ship-to-shore messages and charge commercial rates for such communications.

The Air Force, it was brought out in the Secretary of Defense's report

WHEN DOES YOUR MEMBERSHIP EXPIRE?

LOOK AT THE EXPIRATION DATE ON YOUR MEMBERSHIP CARD. IF IT IS WITHIN 30 DAYS, IT'S TIME TO PAY YOUR DUES.

is preparing legislation under which it would be able to establish "radar fences" for the air defense of the continental limits of the United States with the necessary land-based air-warning and control installations and facilities.

Unification of Communications Functions

In the sphere of communications, Secretary Forrestal's report definitely depicted the progress of unification that had been accomplished by the three armed services. The Secretary's report cited that "the field of communications and electronics from the viewpoint of joint operations has been carefully studied," and, through the work of the Joint Communications-Electronics Committee of the Joint Chiefs of Staff, common communications procedures and doctrines for the services, including the effective training of personnel in their use, have been recommended. The Joint Communications-Electronics Committee is composed of Maj. Gen. S. B. Akin, Chief Signal Officer of the Army; Rear Admiral Earl E. Stone, Chief of Naval Communications; and Maj. Gen. Francis L. Ankenbrandt, Director of Communications of the Air Force. A total of 13 Joint Army-Navy-Air Force Communications publications on joint operations have been published during the past year in addition to the publication of 27 changes to existing publications to keep them up to date.

The report of the Munitions Board, included in the Secretary's report, stated that communications was one of the 11 major items for which estimates are being compiled and maintained for mobilization requirements planning and in weapons procurement programs. Twelve committees of the Munitions Board also are studying the availability of materials considered essential in time of emergency, including copper, lead, zinc, and aluminum, all important for communications and radio equipment. The chiefs of the Logistics agencies of the three services have been working closely in formulating uniform procurement regulations and requirements, while the top-flight executives of industry in serving on advisory committees, such as the 30-member Electronics Equipment Advisory Committee, have been aiding the Munitions Board. The interservice communications-electronics committee has also been closely tied into the Munitions Board's activities.

In research, the Research and Development Board — whose former head, Dr. Vannevar Bush, received the highest praise from Secretary of Defense Forrestal—stated in its report that "in line with the policy of standardizing equipment for use by the several services, insofar as practicable, and of eliminating duplication of research and development effort," it had allocated to the Signal Corps the responsibility for the development of ground-based electronic countermeasures equipment for the Army and the Air Force. This had been effectuated on the basis of agreements made through the RDB Committee on Electronics.

Tube Standards Committee

The American Standards Association Sectional Committee on Electron Tubes C-60 formerly sponsored by the Electrical Standards Committee is now sponsored by the Joint Electron Tube Engineering Council, according to Virgil M. Graham, chairman of the Council.

According to Graham, the committee is being re-organized and its scope is being broadened to include definitions; classifications; methods of rating and testing; dimensions and interchangeability of electron tubes for all applications. The former committee concerned itself only with electron tubes for industrial use.

The new committee will include representatives of the American Association of Electrical Engineers, the American Association of Railroads, Electric Light and Power Group; the Institute of Radio Engineers; the Joint Electron Tube Engineering Council; the National Bureau of Standards, the National Electrical Manufacturers Association and Radio Manufacturers Association; Telephone Group; the Army-Navy Electronic Engineering Agency, and liaison from the Canadian Standards Association.

Radiophotos From Sweden Aid In Forecasting Magnetic Storms

Photographs of the sun taken in Sweden and transmitted to this country by Radiophoto, whenever the sun is obscured in New York, are making it possible for RCA Communications, Inc., to continue without interruption its daily forecasts of sunspot activity. Observations of solar disturbances and the calculation of their effect on shortwave transmission have been carried out by RCA for several yea The information provides advan warning of magnetic storms and pe mits rerouting of radiotelegraph tra fic to circuits outside the areas affe ed.

Until recently forecasts of radi conditions have depended upon su cess in "shooting" the sun through refracting telescope installed atop t RCA Central Radio Office at Broad Street, New York. But a r cent prolonged cloudy period r vealed the need for a supplementa source of data in emergencies, an led to the present cooperative a rangement with the Royal Board Swedish Telegraphs in Stockholm a the Stockholm Observatory in Sal jobegen, Sweden. When observati by RCA in New York is impossib a photograph of the sun, taken by D Yngve Oehman in charge of so work at the Stockholm Observato is transmitted to New York by radi photo.

Investigations conducted for se eral years by RCA engineers reveal that the relation between sunspot a tivities and their effect on shortwa radio communication was not a ma ter of sunspot size, but of the po tion of the spots on the sun's surfa It was learned that the maximum e fect on radio wave propagation created when the solar disturban move into a "critical zone," an ar about 26° in radius from the optic center of the sun. Basing deductio on this fact, engineers of RCA Co munications are now able to foreca magnetic storms more accurate than ever before.

Cecil V. Lawrence Dies

Cecil V. Lawrence, superintende of South American landlines for A America Cables and Radio, Inc., a one of the builders of the fam Trans-Andean cable, died at his ho in Villa Mercedes, Providence of S Luis, Argentina. He was 64 ye old.

Mr. Lawrence joined the Unit States Army during the first Wo War and rose to the rank of Maj in the Signal Corps.

Vulliamy Retires

Major-General C. H. H. Vullia C.B., D.S.O., recently a visitor to U signal installations, has retired fr active duty as the British Direc of Signals. His successor is Maj General W. A. Scott, C.B.E.

"Madame X" was the code name, during research and development, for an entirely new system of recorded music . . . perfected by RCA.

The remarkable background of **"Madame X"**

ow the identity of "Madame X," e *unknown* in a long search for ne perfection, has been revealed. om this quest emerges a complete- integrated record-playing *system* ecords and automatic player—the st to be entirely free of distortion the trained musical ear . . .

The research began 11 years ago at CA Laboratories. First, basic factors re determined—minimum diameters, different speeds, of the groove spiral the record—beyond which distortion uld occur; size of stylus to be used; desired length of playing time. From these came the mathematical answer to the record's *speed*—45 turns a minute—and to the record's size, only 6⅞ inches in diameter.

With this speed and size, engineers could guarantee 5⅓ minutes of distortion-free performance, and the finest quality record in RCA Victor history!

The record itself is non-breakable vinyl plastic, wafer-thin. *Yet it plays as long as a conventional 12-inch record.* The new RCA Victor automatic record changer accommodates up to 10 of the new records—1 hour and 40 minutes of playing time—and can be attached to almost any radio, phonograph, or television combination.

Not only records are free of surface noise and distortion—the record player eliminates faulty operation, noise, and cumbersome size. Records are changed quickly, quietly . . . RCA Victor will continue to supply 78 rpm instruments and records.

This far-reaching advance is one of hundreds which have grown from RCA research. Such leadership adds *value beyond price* to any product or service of RCA and RCA Victor.

RADIO CORPORATION of AMERICA

World Leader in Radio—First in Television

AIR FORCE

Air Force Secretary's Report

In his annual report, Air Secretary Symington emphasized communications and their importance in the Air Force activities. He said:

"Communications equipment is becoming more complex at a greater rate than aircraft. At the same time such equipment is becoming more important to our operations. We must direct repeated attention to the necessity for catching up in our production and use of this equipment. Our command communications system, inherited from World War II, is now obsolete and no provision has been made for its replacement. Only one-third of the amount requested for communication equipment on new aircraft has been provided. Electronic equipment must be manufactured; it cannot be improvised. Nothing is gained and no money is saved by failure to equip completely our operating units. One of our most chronic personnel shortages is in the field of communications. The Air Force and the Army seek to assist in easing this problem on a long-range basis by sponsoring a military amateur radio system which would provide a source for scarce experienced personnel at minimum cost.

"The defense of the United States from air attack is a task which will require the coordinated efforts of all defense agencies. A primary requirement is the establishment of land-based air warning control installations. Difficult construction, manufacture of equipment, and training of personnel are factors in this project. Delay in its initiation involves great risks."

In addition he had this to say about aircraft warning systems:

"The first requisite of defense of the United States against hostile aircraft is a system by which such aircraft can be detected at long range and our own intercepting aircraft controlled in flight so that interception is possible. Such a system was the key to the success of the Royal Air Force in the Battle of Britain. It requires extensive radar and radio installations, complex control centers, and a high state of training of technical personnel. Without such a system our own fighter aircraft cannot hope to intercept attackers.

"Establishment of a satisfactory system involves a long-term program of research and development, and manufacture and training. It also calls for complete cooperation within the National Military Establishment. The immediate, pressing need to this end is enabling legislation for the initiation of such a long-range program.

"In November 1947 the Air Force completed its outline plan and program for such a system. Thereupon enabling legislation for construction was prepared and circulated for interservice coordination; but attempts to bring the matter before the Eightieth Congress were unsuccessful.

"Because of its critical importance to our national security, the Air Force recommends top legislative priority consideration for this aircraft control and warning system."

1948 a Year of Steady Growth for the Air Force

Last year was a memorable one for the United States Air Force, a year of steady growth and constant progress toward a permanent, modern air arm, marked by numerous advancements in aeronautical research, aircraft development, and flying techniques.

During 1948, the Air Force accomplished the following:

Performed an aerial supply operation into blockaded Berlin that fed the city entirely by air for more than half the year.

Captured the world speed record.

Continued development of cruise-control and air-to-air refueling methods which greatly increased the range of its larger bombers.

Began a vigorous program to strengthen the civilian components, with a Lieutenant General appointed as Special Assistant to the Chief of Staff for Reserve Affairs.

Reorganized its domestic command to improve the air defense of the United States.

Increased its 55 operational groups to 60.

Launched an aircraft procurement program designed to provide the Air Force with the most modern equipment in sufficient quantity to meet requirements.

Ordered, accepted, and tested numerous types of new aircraft.

Organized a permanent women's organization in the Regular Air Force.

Welcomed a new Chief of Staff, General Hoyt S. Vandenberg, upon the retirement of General Carl Spaatz, first Chief of Staff of the autonomous Air Force.

Increased its personnel strength from a total of 339,246 at the beginning of 1948 to more than 410,000, all volunteers at the end of the year.

Griffiss Air Force Base, Rome, New York, reopened as electronics center, with three units to be moved there during 1948 and 1949 from Red Bank, New Jersey, Cambridge, Massachusetts, and Middletown, Pennsylvania.

Continental Radar Screen

The "radar screen" for the continental United States, which will cost about $161 million in its initial preparedness phase, was described by two high Air Force officers and spokesmen for the Army and Navy at a Feb. 10 hearing of a House Armed Services subcommittee on a bill to authorize the Secretary of the Air Force to establish land-based air warning and control installations for the national security. Detailed plans for the radar and control installations were given in executive sessions Feb. 11.

While the immediate need is for $85 million for construction and location of the strategic radar-control centers, Maj. Gen. Gordon P. Saville, who presented the situation to the House subcommittee in a very able manner, stated that in the plans the Air Force will request $26 million for radar equipment and additional telephone and telegraph facilities. The Air Force is using some $46 million worth of equipment which had been procured for World War II and since that time.

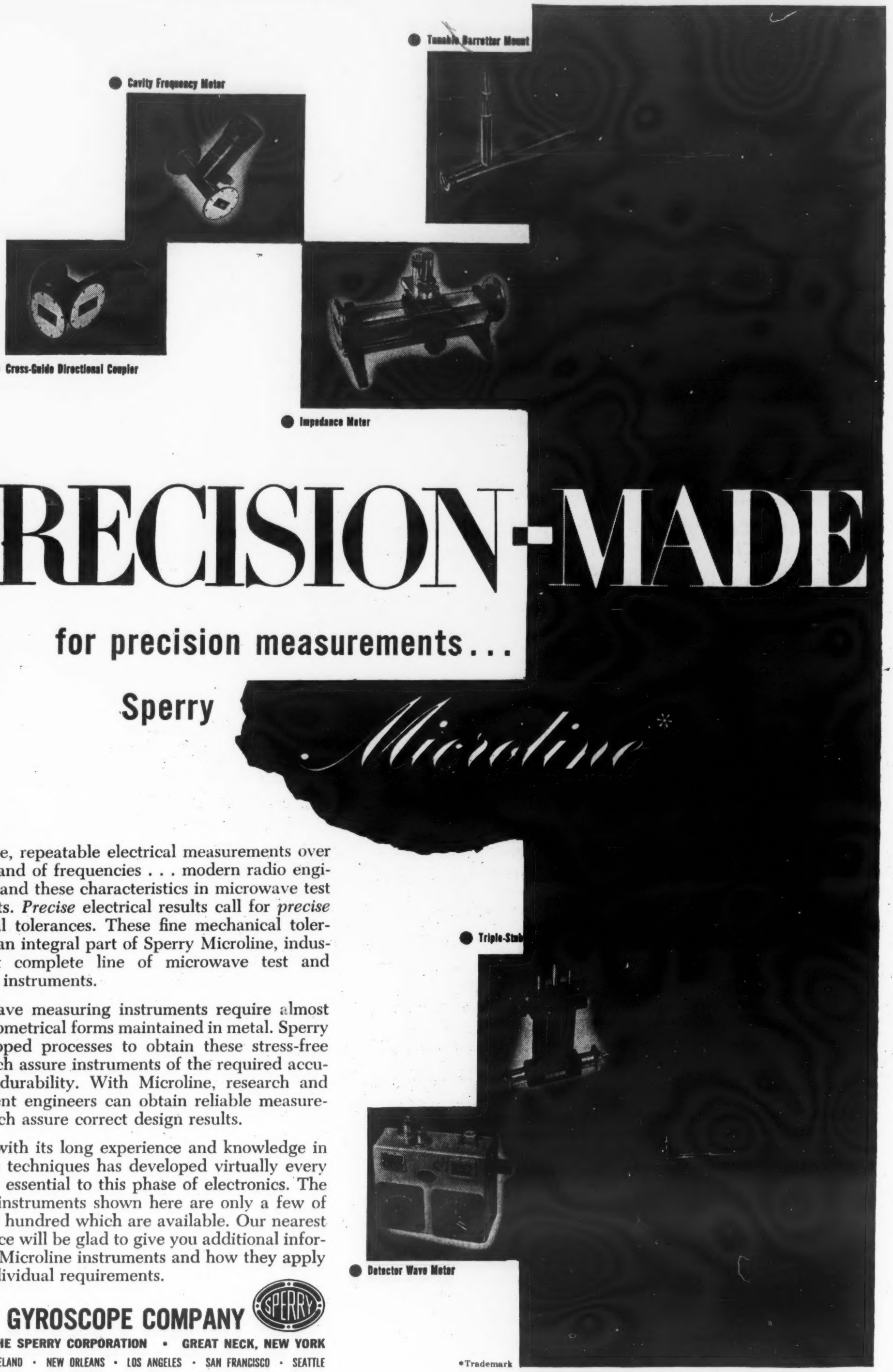
General Saville highly praised the cooperation and efforts of the radio electronic manufacturing industry and stated that the Air Defense Commands are enjoying perfect cooperation from the laboratories of industry and universities.

Col. Rex V. D. Corput, Chief of plans and Operations of the Signal Corps, represented Maj. Gen. S. [illegible] AKin, Chief Signal Officer, as a technical expert for presentation of the Signal Corps work in the executive sessions.

Arctic Bomb Tests by Air Force

The Air Force began Arctic tests of radio-controlled bombs and V flying buzz bombs in Alaska in February.

Tests at Ladd Air Base will involve use of the 12,000-pound "Tarzon



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Microwave measuring instruments require almost perfect geometrical forms maintained in metal. Sperry has developed processes to obtain these stress-free forms which assure instruments of the required accuracy and durability. With Microline, research and development engineers can obtain reliable measurements which assure correct design results.

Sperry with its long experience and knowledge in microwave techniques has developed virtually every instrument essential to this phase of electronics. The Microline instruments shown here are only a few of the several hundred which are available. Our nearest district office will be glad to give you additional information on Microline instruments and how they apply to your individual requirements.

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the 1000-pound "Razon," and the American model of the buzz bomb used by the Germans against London in World War II.

The "Tarzon" and the "Razon" are dropped from planes in the conventional manner and are classed as "free falling." However, through radio devices operating the fins, their fall can be affected and bomb steered toward a target.

The buzz bomb is powered, has rudimentary wings and can be launched from the superfortresses.

New lightweight portable teletypewriter for field use. Teletypewriter itself weighs only 45 pounds, can be carried by paratrooper in making drop.

SIGNAL CORPS

General Akin Cited By Poor Richard Club

For his efforts in "modernizing . . military communications to meet . . the lightening speed of atomic warfare" Major General S. B. Akin, the Army's Chief Signal Officer, has been awarded the Citation of Merit by Philadelphia's Poor Richard Club.

The citation, presented February 15th, recognized a program General Akin has pressed to integrate military communications into a versatile yet tightly knit global net. "In awarding this Citation of Merit," the document states, "we also take cognizance of General Akin's long and distinguished career as a gallant officer who was General MacArthur's Signal Officer from Corregidor to Tokyo and the Army's Chief Signal Officer since April 1st, 1947."

In accepting the award, General Akin pointed to the importance of communications in defense with the declaration that the first essential for security is "the ability to act—and react—instantly. It is not enough for a man to have an educated brain to guide him, and a tough fist to defend him, if the nerves that connect them do not work with lightning speed. Let the nerves of this man become slow, or be paralyzed, and he is doomed."

To demonstrate its world wide communications network, the Signal Corps set up a "telecom" conference at the Poor Richard Club with teletyped messages being flashed on a screen. Temporary control of the 20,000-mile net was transferred from the Pentagon to the Poor Richard Club. The net included Washington, Philadelphia, Berlin, Tokyo, Alaska, Honolulu, and Panama.

New Portable Teletypewriter

Portable teletypewriter equipment so light that a parachutist can carry it on a jump from an airplane has been developed and adopted by the Army, promising a major advancement in military communications.

Weighing but 45 pounds, compared with current field equipment that weighs 225 pounds, the new portable teletypewriter is but one-fourth the size of the old, has 300 fewer parts, is considerably stronger and consequently requires far less maintenance. The new equipment is capable of transmitting and receiving messages 66 per cent faster than existing types and will operate on both wire and radio circuits. It is waterproof and, should it be used in amphibious operations, could be floated onto a beach.

The development is the fruition of a 20-year-old project that did not get under way in earnest until World War II was nearly over. (In 1937 a portable teletypewriter for ground troops was given a field trial by the 51st Signal Battalion in Texas maneuvers.)

Because of its light weight the new teletypewriter can be used much closer to the front lines than has been the case. During World War II teletyped messages could only go as far forward as a division headquarters. How much farther forward the new equipment can be used will be determined in forthcoming field tests.

The portable teletypewriter was developed by the Signal Corps Engineering Laboratories of Fort Monmouth, through a research and development contract with Kleinschmidt Laboratories of Highland Park, Ill.

There are three components to a complete field unit: the teletypewriter itself, weighing 45 pounds; a power unit, and a case of accessories. The three together weigh 116 pounds. All units are waterproof, both to permit flotation in amphibious activities and to provide complete protection from weather. One man can carry the teletypewriter itself, while two men can carry all three units.

The field teletypewriter in current use weighs more than 225 pounds and—if a vehicle is not available—requires four men to carry it. With power unit and accessories, present field equipment totals more than 400 pounds and requires seven men to carry it.

Signal Corps Laboratory Named as Major Research Center According to Secretary Forrestal's 1948 Report

The RDB Electronics Committee coordinated developments in ultra high frequency communication equipment that may be used either by the Air Force or the Navy. Another example of unification in the research field was the recommendation of the RDB Chairman (now Karl Compton, former M.I.T. President) on the basis of a report prepared by the Panel on Radar of the RDB Committee on Electronics, the

QUICK QUIZ

With a Helpful Answer

FOR COMMUNICATIONS MEN

Problem:

A company has a circuit between offices "A" and "B" consisting of 40 miles of No. 12 BB iron wire. Extending from "B" to "C" is another circuit made up of 25 miles of No. 12 BB iron. Changing traffic conditions call for a direct through circuit from "A" to "C". The use of the existing wire facilities does not provide acceptable transmission since the measured loss is 20 db and requirement is for a 5 db to 6 db circuit. How can this requirement be met?

Possible Solutions:

(a) One possibility would be the replacement of the iron wire with .104 copper wire. This would provide a calculated 4.5 db circuit but present day wire and construction costs would require an expenditure ranging from $12,000.00 to $18,000.00.

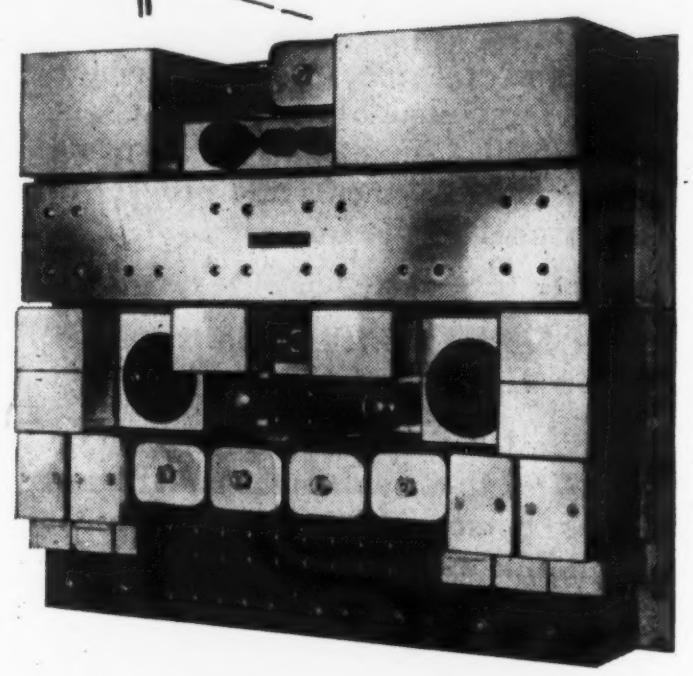
(b) Another solution would be the use of a voice frequency telephone repeater at location "B" capable of a minimum *usable gain* of from 14 db to 15 db under all ordinary weather conditions. If such a repeater could be found then this, obviously, would be the correct solution since the cost of a repeater is less than 5% of the cost of wire replacement.

The Logical Solution:

Yes—the logical solution is a voice frequency telephone repeater—*if* it's a Kellogg Repeater. Here's why—

One of the most important factors in obtaining maximum usable gain in a voice frequency repeater is the limitation of the band of frequencies to be amplified. In the Kellogg repeater this is accomplished in the No. 204 filter which has exceedingly sharp cutoff characteristics outside the voice band, i.e. below 300 cps and above 2700 cps.

Another very important consideration in establishing stable balance at the highest gain is the ability to obtain fine adjustments of resistance and capacity in the balancing net with the maximum of ease. This ideal condition is provided in the No. 1 balance network of the Kellogg repeater by the use of continuously variable potentiometers (two in each net) and a series of small capacity steps both readily adjustable by hand or screw driver. **Thus the time-consuming and comparatively inaccurate method of strapping to adjust for balance is completely eliminated.**



Gain adjustments (also screw driver adjusted from the front of the repeater) are accurately calibrated in 1 db steps so that the gain being obtained is always known without the necessity for measurement. Other refinements in Kellogg repeater design include (1) the use of push-pull amplification eliminating harmonic distortion and cross talk or other interference which may be introduced through the power source, (2) the operation of all components at conservative values of current and voltage well below the maximum ratings assuring long, trouble-free life, (3) unit type construction mounting on standard 19" equipment racks thus giving the flexibility necessary for adaption to various circuit requirements, (4) a wide variety of line units for different circuit or signalling functions and (5) provision of test and monitoring jacks for checking tubes and repeater operation.

Kellogg Repeaters are available for operation from either 24 volt or 48 volt battery or from a 105-125 volt 60 cycle AC power source.

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a study be established by the RDB in cooperation with the Joint Chiefs of Staff's Joint Communications-Electronics Committee to consider the overall problems of air defense radar requirements.

The Squier Signal Laboratory of the Signal Corps at Fort Monmouth was one of three centers of military research mentioned by the Research and Development Board for the advancement of technology for national security. Secretary of Defense Forrestal commended more highly than any other achievement the work of the Research and Development Board which has aided the United States in maintaining "a fair margin of superiority in practically every technical area of weapon development". The designation of the Squier Signal Laboratory as one of the three major centers of research, too, was a tribute to the farsightedness of the Chiefs of the Signal Corps, who have made research achievements and progress a major goal of the Corps.

New Signal Center Opens At Camp Gordon, Georgia

In order to adequately train and place in the field sufficient Signal Corps personnel to satisfy present commitments, the Department of the Army authorized the activation of a signal corps training center, which comprises the Southeastern Signal School and a unit training group at Camp Gordon, near Augusta, Georgia.

With the establishment of this new training center at Camp Gordon, two signal schools are now in operation within the United States, the other is located at Fort Monmouth, New Jersey. The Southeastern Signal School is designed to accomodate some 5,000 enlisted students when operating at full capacity.

Colonel Harry Reichelderfer, the commanding officer, (now Brig. Gen. Reichelderfer), arrived at Camp Gordon on the first of October, 1948, and immediately opened his headquarters. Preparations were made to receive the first group of students, and open the school by November 1, 1948. The initial cadre for the training center came from Fort Monmouth and by October 14, enough officers and enlisted men had arrived at the Georgia site to begin the task of opening the signal school. Initial staff assignments were made. Colonel R. P. Lyman became the deputy commander of the Training center and commandant of the Southeastern Signal School. Colonel Walter J. Rosengren was appointed commanding officer of the unit training group. Lieutenant Colonel L. S. Gardner was assigned as assistant deputy commander and Lieutenant Colonel Philip Rose was named commanding officer of the Signal training regiment. The new training center has expanded rapidly.

Paratrooper ready to jump with new lightweight portable teletypewriter.

Inasmuch as the radio operator high speed manual course was scheduled to start on November 1, 1948, and the radio repairman course was to commence December 1, 1948, all effort was extended to provide class and code rooms for the students of the radio division of the school. This division of the school started training high speed radio operators and radio repairmen on schedule.

The common subjects division of the signal school was ready to operate and opened officially on December 1, 1948. Instruction in the Common Subjects Division includes principles of electricity, basic shop (soldering, metal working, and use of hand tools), and basic signal communication. These subjects are common to many courses of instruction being taught, hence the title.

The other divisions of the Southeastern Signal School, such as the communication center division and wire division, also have starting deadlines to meet. The comunication center division will train students to be teletype operators and message center clerks; and the wire division will train students to be linemen, cable splicers, and power equipment maintenance men. These courses were all scheduled to start on February 1, 1949. The excellent cooperation of the post engineers in supplying available material, equipment, and personnel enabled these four divisions to meet their building and classroom requirements on schedule. The officers, enlisted men, and civilians of the cadre completed the organization and the installation of the necessary plant, training aids, and instructional material in time so that the courses could start on schedule.

Housing for dependents of the cadre of the Signal Corps training center was an immediate problem. Through the efforts of the commanding general of Camp Gordon, Brigadier General Truman Thorson, the city of Augusta has set up a military housing program. The city will attempt to provide before April 1, 1949, a thousand units of various types for the military personnel of Camp Gordon and splendid progress has been made up to date.

In spite of the fact that only limited special service, Army exchange and other facilities existed at Camp Gordon, due to the fact that the camp had been on a caretaker status for some time, the Camp Gordon headquarters' staff have now provided with the assistance of the staff of the Signal Corps training center and others, all necessary services including an officers club, service clubs, a non-commissioned officers club, and several camp exchanges. These facilities serve not only the officers, enlisted men, and civilians of the Signal Corps training center, but also those of the military police school, the engineer aviation training center, and other installations located at Camp Gordon.

"Wamcat"

The 65-foot Alaska Communication System maintenance boat "Wamcat", skippered by Master Sergeant George E. Stanford, Signal Corps, and a crew of four, recently arrived at Juneau, Alaska from Seattle, Washington to begin service in the maintenance of submarine ocean cable repeater stations and VHF radio repeater stations in Southeast Alaska. The "Wamcat", formerly used by the Transportation Corps, U. S. Army, is equipped with a 1,000 watt radio transmitter, which may be set up immediately for use as an emergency radio station in South

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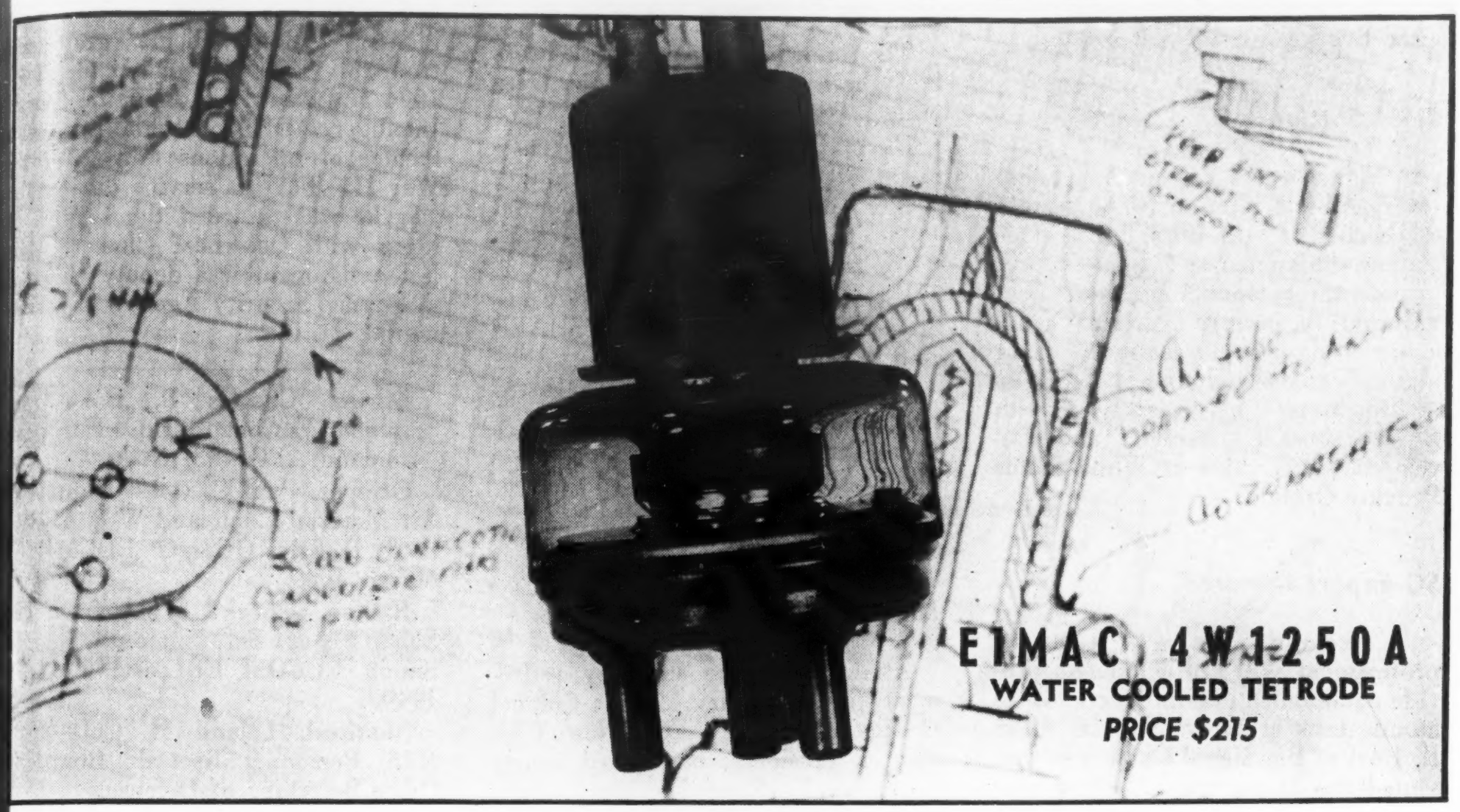

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Grid-Plate	0.05 uufd
Input	12.8 uufd
Output	5.6 uufd
Transconductance (i_b=200ma., e_b=2500v., E_{c2}=500v.)	5200 umhos

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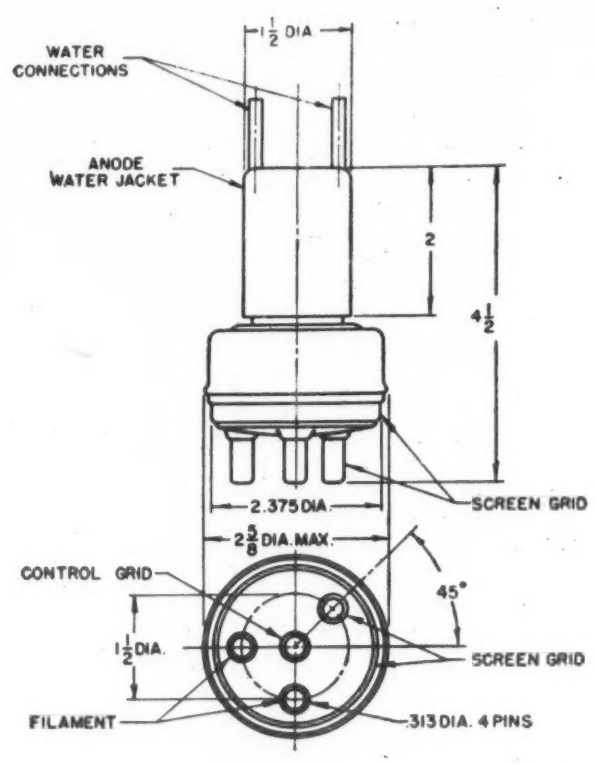
D-C SCREEN VOLTAGE	750 VOLTS
D-C GRID VOLTAGE	– 500 VOLTS
D-C PLATE CURRENT	750 MA.
PLATE DISSIPATION	1250 WATTS
SCREEN DISSIPATION	30 WATTS
GRID DISSIPATION	10 WATTS



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eastern Alaska should the need arise.

Sergeant Standford, a veteran of six years with the Army, has been with the ACS since August, 1948. He is assisted by Sergeant First Class Fred C. Dawley, diesel engineer, who joined the ACS in January, 1948 after five years with the Navy.

Field Station

A Signal Corps Engineering Laboratories Field Station was recently established at Fort Bliss, Texas. This station, designated as Number 1, will provide the personnel and equipment required to perform certain Signal Corps radar, comunications, upper atmosphere research and photographic functions in connection with Guided Missile Research and Development activities at White Sands Proving Ground.

SC Expert Honored

In recognition of his "exceptional professional skill" in helping to provide communications for the 1947-48 atomic tests at Eniwetok, Mr. Alton R. Hart of the Signal Corps was presented the Meritorious Civilian Service Award in the Pentagon February 1. The presentation was made informally in the Office of the Chief Signal Officer by Colonel W. T. Guest, chief of the Army Communication Service Division. Mr. Hart is a member of Colonel Guest's staff.

The Citation presented to Mr. Hart recalled that at Eniwetok he "showed exceptional professional skill in the design, engineering and operation of complex beamed high frequency antennas which were used for communications to the outside world, with flawless operation." The citation also noted his willingness to assume responsibility, and the assistance he gave in training communications personnel.

Mr. Hart has been in the Office of the Chief Signal Officer since 1940.

ASA School To Carlisle

The Army has announced that the Army Security Agency School will move from Vint Hill Farms Station, Warrenton, Virginia, to Carlisle Barracks, Pennsylvania, about May 1.

It is expected that the school will be in full operation at its new location by mid-July. Normal operations will not be suspended during the movement of facilities. The Army Security Agency Schools trains both officers and enlisted men in advanced phases of Signal Communication.

Changes in Key Personnel

New Stars

The following Signal Corps officers have been appointed brigadier generals:

Harry Reichelderfer, now in command of the Signal Corps Training Center at Camp Gordon, Georgia. (Was Signal Officer of the Sixth Army in the Pacific during WW II.)

Kirk B. Lawton, now Deputy Chief Signal Officer. (Served on the SHAEF staff in WW II.)

Wesley T. Guest, now in charge of the Army Communication Service. (Was Director, Plans and Operations for the Chief Signal Officer in Washington and later in the Pacific Theaters in WW II.)

Dixon Retires

Attaining to the statutory retirement age January 29th, Colonel George P. Dixon, AFCA New York chapter president, has ended nearly 33 years of military service.

Beginning his Signal Corps career with the California National Guard, Col. Dixon saw active service from Mexican border duty in 1916 through both World Wars overseas.

Col. Dixon is a vice president of the International Telephone & Telegraph Company.

Williams Retires

Colonel Grant A. Williams has been retired from the Army and has joined the International Telephone and Telegraph Corporation. He will be in charge of company interests in the Middle East, with headquarters at Cairo. A pioneer in the development of communications for tanks and armored units, he was instrumental in establishing the military specifications for all radio equipment used in American tanks and armored forces in World War II.

At the end of the Sicilian campaign he returned to England with General Bradley and, on October 15, 1943, was appointed Signal Officer of the First Army. In this post he planned and later directed the operation of the entire program of communications for the landing of the First Army in Normandy. He continued with the First Army under General Bradley and, later, under General Courtney Hodges, during the five campaigns in northern Europe.

Colonel George A. Bicher

Colonel George A. Bicher died at Walter Reed General Hospital at the age of 46, on 6 January, after a long illness. Colonel Bicher graduated from the U. S. Military Academy in 1924 and was director of the Signal Intelligence Division in the European theater of operations during World War II. For his service during the war he was awarded the Legion of Merit with Oak Leaf Cluster. His last assignment was deputy chief of the Army Security Agency in Washington, D. C.

Brown, Charles B. Col.—from Shipment EuCom to Hqs. European Command APO 403, N. Y.

Gripper, Paul C. Col.—from Hqs. Air Material Command W-P AFB to P & D Div OCSigO EDCMR: 1 March 1949.

Richon, George L. Col.—from The Signal School Ft. Monmouth, N. J. to Shpmt EUCOM EDCMR: 1, April 1949.

Stanford, Leland H. Col.—from D/A Personnel Records Board to Office Secretary of Defense.

Stanley, Stewart W. Col.—from Sacramento Signal Depot to McCornack Gen Hosp Pasadena, Calif.

Vitzthum, Harry L. Col.—from XXVI Corps to Sacramento Signal Depot.

Wooley, George F. Col.—from Shipment EuCom revoked to P & D Div OCSigO.

The primary wartime assignments of the above named officers were as follows:

Col. C. B. Brown—Signal Officer XIII Corps Providence and then Director Signal Int Sub Div G-2 SHAEF

Col. P. C. Gripper—Staff Communication Officer, Hq AAF—China Theatre

Col. G. L. Richon—Executive Officer Signal Section, Hq USF, IBT and chief of Sig Sec China Serv Comd

Col. L. H. Stanford—Signal Officer, VIII Bomber Command, ETO

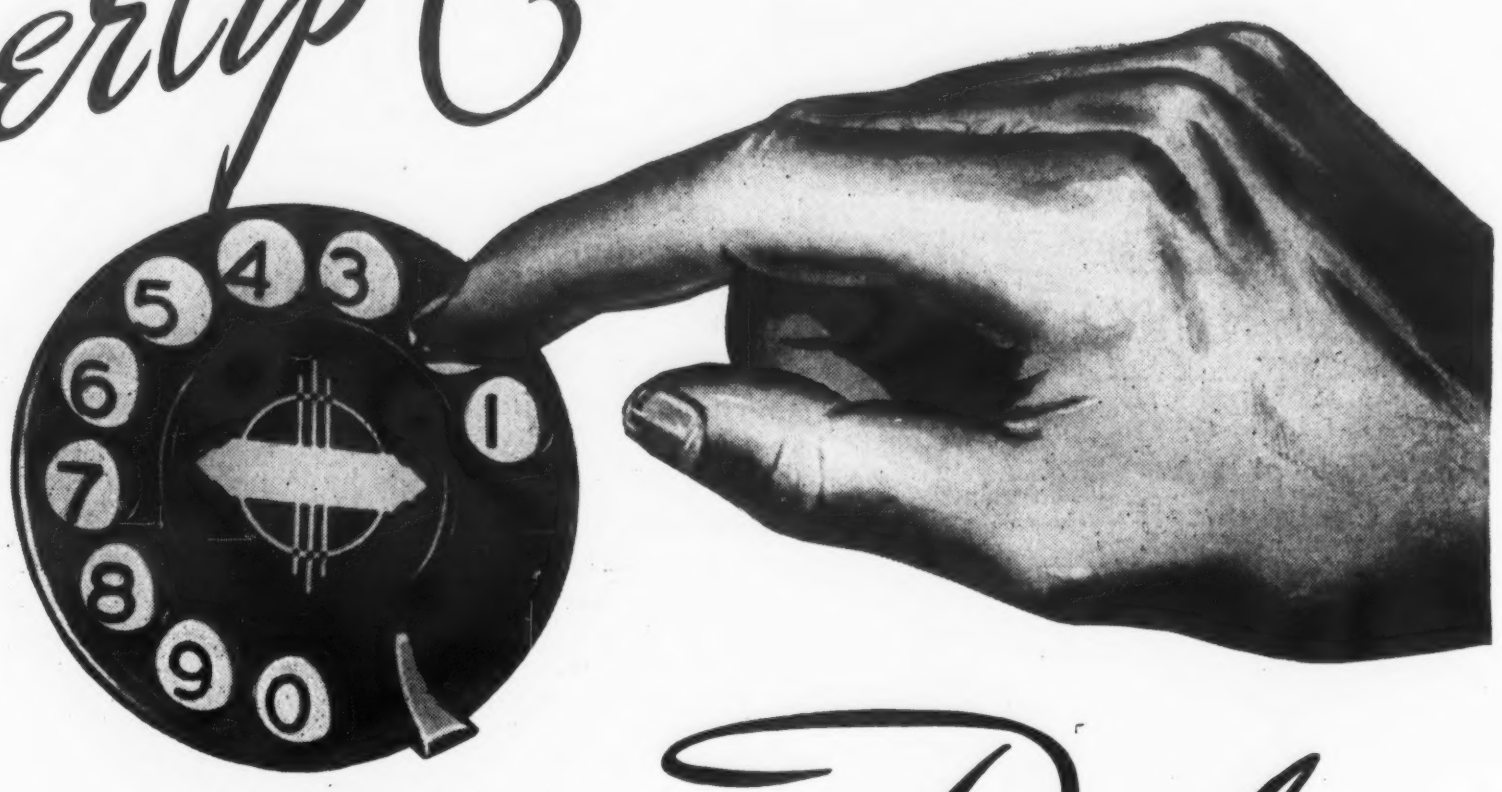
Col. S. W. Stanley—Deputy Chief Signal Officer, USACA Sec, U.S. Forces Austria

Col. H. L. Vitzthum—Director Control Div. OCSigO

Col. G. F. Wooley—Signal Officer 7th Army

FOR

Fingertip Control



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Signal Corps officers graduated January 22nd are:

Lt. Col. Oscar C. Buser
Lt. Col. Homer L. Davies, Jr.
Lt. Col. Wm. B. Feindel, Jr.
Lt. Col. William J. Given

NAVY

Sullivan Report Reviews Navy Communications

Citing that the hypotheses of "push-button"warfare and remote control battles are far from realization and may not fully materialize "in our time" but that scientific advancements and innovations in naval weapons and equipment are proceeding with great strides, particularly in electronics, the annual report of Secretary of the Navy John L. Sullivan gives a comprehensive review of the different phases of communications operations and the use of research into electronic devices by the Navy Department.

The Secretary's report brought out that approximately 40 million messages are annually handled over the Navy's shore comunications system with an average of five primary, 13 major, and 28 minor stations, and 342 tributary message centers in operation. As a tribute to the direction of Rear Admiral Earl Stone, Chief of Naval Communications, although his name was not mentioned, the Secretary's report cited that the Naval Communications system had been reorganized and reengineered during the fiscal year of 1948 to provide more effective service by grouping, wherever feasible, the several communication components in particular areas under a single activity designated as a communications station.

"Consolidation and rehabilitation of shore communications facilities is in progress, including the replacement of certain deteriorated temporary buildings, and additional communications facilities, necessary for the support of operating forces in the Mediterranean area, have been established," the report stated. But it was emphasized that Naval Communications' "high degree of efficiency in the handling of message traffic has been maintained."

One of the major needs of the Navy which was stressed by Secretary Sullivan in his report was that, with the Fleet and many of its shore establishments in "mothballs", there is a definite requirement of greater funds for maintenance and provision for world-wide communication and meteorological networks, and modifications and modernization of communications and electronis installation are essential. In the case of naval aviation, the report brought out that the Navy in cooperation with the Air Force and the Civil Aeronautics Administration had engaged in wide installation of GCA systems to make all-weather flying an established fact. Tests have been completed on equipment of similar type for use aboard carriers which have indicated the feasibility of GCA use with the Fleet.

Utilization Facilities

Studies for the common utilization of communication facilities by the armed services are continued, the report related. Some of the results during the 1948 fiscal year included integration of the land-line systems in the Canal Zone, sharing with the Air Force the Navy multiple circuit between Washington and the Canal Zone, establishment of a National Facsimile Weather Network, and utilization by the Navy of the Air Force Flight Reporting System for flight control purposes. Plans providing for joint use of certain naval radio stations by the Coast Guard and the Navy were approved during the fiscal year and are being implemented.

Radiophoto service has been maintained by Naval Communications necessarily on a small scale, the report cited, and is used especially for transmitting weather maps and related information on daily schedules. Official Navy Business in the 1948 fiscal period was transacted between Antarctic units and Washington through radiophoto transmission of documents, and in one instance a new world record for long distance direct-radiophoto transmission, 10,581 statute miles, was established. The Secretary's report also brought out that the Navy had been represented in the 1948 fiscal year at the Atlantic City conferences, on the Provisional Frequency Board, the International Aeronautical Radio Conference and two ICAO regional parleys.

Radio research was the largest program of the Naval Research Laboratory, Secretary Sullivan's report brought out. It produced equipment during the 1948 fiscal year ranging from an important new microwave tube to a complete air-borne telemetering system for guided missiles. Of major importance to naval communications was the preparation of a series of reports analyzing the relative merits of amplitude and frequency modulation for ultra-high frequencies.

As a part of the research in sonar systems, a new underwater dome was designed which will be installed in a naval vessel for sea testing. New magnetostrictive materials were investigated, and development of improved hydrophones for low-frequency operations was undertaken. Research in cooperation with the Naval Medical Research Institute disclosed the possibility of examining internal disorders in humans or animals by means of supersonics.

Smaller Airborne Systems

With regard to aircraft electronics development work by the Navy, the Secretary's report stated: "The goal of the work in aircraft electronics is the development of smaller, higher-powered electronic and electrical systems for naval aircraft, with higher sensitivity and high performance characteristics. This work has been directed mainly toward the support of specific pilotless aircraft now under development. Space in aircraft is becoming more limited as the number of essential equipments increases, and the speed of the aircraft increases. For this reason, miniaturization and improvement of aircraft electronic components has become increasingly important, and the progress made will affect all electronic equipment.

"Many modern antennas for high-speed aircraft have been completed and installed for the first time in production aircraft, thus culminating into radically new antenna designs the research which began during the war years. As a result of investigations made for the Navy by the National Bureau of Standards, new exterior lighting designs for aircraft have been established and a new method of lighting instruments has been developed.

"The Bureau of Aeronautics is receiving valuable assistance in its electronics program from a group of selected key electronics officers in the Naval Reserve. These officers meet twice a month in the Bureau of Aero-

nautics for the purpose of reviewing current electronic developments, technical and operational features of current equipments, their utilization and future requirements. From the information obtained in these reviews and studies, recommendations are made for the improvement of equipment and for the programming of electronics work."

In training activities, the Secretary's report noted that shore-based training is resuming normal operations after having been disestablished following V-J Day. That includes the Fleet Electronics School at Pearl Harbor and the Fleet Sonar Schools at Key West and San Diego.

Carrier Operations by Television

For the first time people were able to sit at home in New York and watch naval operations taking place at sea. In an unprecedented experiment last August, naval and air maneuvers were televised successfully from the flight deck of the carrier *Leyte*.

The program, lasting one and three-quarters hours, was carried over WNBT and the National Broadcasting Company's East Coast network. The image was sharp and clear, except for brief periods when the *Leyte* was changing her course. The necessity of keeping the directional television transmitter constantly trained on the receiving antenna atop the Empire State Building had been the chief problem faced by engineers preparing for the experiment.

The audience, estimated by NBC at "millions," saw the *Leyte* and her escorting destroyer plowing through the Atlantic maneuver area near the outer approaches of New York harbor, south of Long Beach, L. I., and east of Long Branch, N. J. They saw the 27,000-ton carrier's planes being prepared for the take-off, and saw twenty-five of them—Bearcats, Avengers and Corsairs—take to the air within nine minutes, some by catapult.

They watched Bob Stanton of the television staff interviewing the ship's officers, pilots and technicians. Rear Admiral Ralph W. Jennings, commander of Carrier Division Four, also was seen and heard.

Meanwhile flights of the *Leyte's* seventy aircraft that were aloft buzzed the mother ship repeatedly. Finally the video camera studied approach techniques as the planes came in to land.

The first fifteen minutes of the program originated in Washington, where John Nicholas Brown, Assistant Secretary of the Navy for Air, and other high Navy officials spoke on the Navy's future role. Admiral Louis E. Denfeld, Chief of Naval Operations, said that our carrier-based planes proved in the war that they can hold their own against any enemy aircraft. Admiral William H. P. Blandy, commander-in-chief of the Atlantic Fleet, described his fleet as "good insurance against war."

During the ship-to-shore telecast, NBC was out of contact with the *Leyte*, and the program was presented instantaneously without editing. Naval officials declared that the implications of visual communications between warships under battle conditions are "tremendous and limitless."—*N. Y. Times*.

Coast Guard Gets Radar Sets

The U. S. Coast Guard recently ordered 60 marine radar sets for Coast Guard vessels operating on coastal waters, inland waterways, and the Great Lakes. The contract calling for approximately half a million dollars worth of equipment, is the largest of its kind ever awarded by the Coast Guard. Delivery started in February and will be completed in May.

It was pointed out that the radar equipment will help Coast Guard crews carry out harbor patrol, inspection duties, and rescue work by providing navigational and anti-collision protection in darkness, fog, and other poor-visibility conditions.

To meet the exacting requirements of Coast Guard duties, all features developed for the marine radar units are called for in the contract. These include an "electronic ruler"—an adjustable circle on the radar scope which can be set to measure and report exact distance of objects from the vessel—and a performance indicator which assures the operator that the equipment is functioning when there are no objects to be recorded. Other features include a "sea return suppressor" to give good radar visibility in rainy weather or in rough seas when objects are invisible to the unaided eye, and a "ship's heading indicator", a flashing line which indicates the ship's course on the radar scope.

Radio Telescope

A radio telescope has been designed and is being assembled by Cornell University engineers. Analogous to an optical telescope, it has a 17-foot parabolic reflector mounted on a polar axis which will follow the motions of the sun and stars. Instead of visual or photographic observation, the information is obtained from a sensitive receiver fed by a small antenna at the focal point of the reflector. To be used under all types of weather conditions, the telescope will be used in a radio astronomy investigation jointly sponsored by Cornell University and the Office of Naval Research.

Designed to withstand winds up to 60 miles per hour and to track with an angular error of less than one-half degree, the telescope will see areas of the sky whose diameter varies from about two to 30 degrees, depending on the frequency employed. In addition to the usual astronomical polar and declination axes, there are two other rotations available—one about a vertical axis to facilitate calibration of the antenna, the second the rotation of the reflector about its own axis for polarization studies.

The sun radiates at all frequencies of the electromagnetic spectrum. The radiation at the radio frequencies is too weak to be detected by commercial broadcast receivers, but occasionally presents interference in the form of static to the shorter wave bands.

This static from the sun and other sources in space, which arrives at the surface of the earth, is the subject of the radio astronomy studies. The earth's atmosphere is transparent to electromagnetic radiation near the visible portion of the spectrum. Through this window, approximately one decade broad, man has obtained virtually all of his knowledge of the universe. It is through a second window, three decades wide, located in the shorter wave radio region of the spectrum (20-30,000 megacycles), that the information from outside the earth called static or noise is to be observed.

As pointed out earlier, the radio telescope is analogous to an optical telescope. There are, of course, important differences. While referring to the instrument as a radio telescope, it is both a telescope and spectograph as it accepts only a bandwidth of frequencies of the order of a megacycle. The radio telescope antenna, for both structural and economic rea-

sons, must be limited in size to same order as the wave length of the incoming radiation. (At 10-centimeter wave length the 17-foot parabola corresponds to about 50 wave lengths.) The radio telescope has an angular resolving power of the order of degrees compared with tenths of second of arc for optical telescopes.

Astronomical telescopes ordinarily record radiation of all polarization indiscriminately, are sensitive to a large fraction of the optical range of frequency, and use receivers such as the photographic plate which integrate the effects over times the order of hours. In contrast to this, the radio telescope has a preference for one plane of polarization, accepts only a small range of frequencies, and integrates the effects over periods of the order of seconds or less.

Electrical Engineering.

Changes in Key Personnel

Communication Station Change of Command

Captain Richard E. Elliott took over command of the Naval Communication Station at Annapolis in formal change of command ceremonies held January 17 at the station. He relieved Captain Paul F. Dugan, who left for Kodiak, Alaska, where he will be commanding officer of the Naval Communication Station.

Captain Elliott, was graduated with the Naval Academy class of 1925. Before reporting there he was commanding officer of the amphibious force flagship, USS Eldorado in the Pacific.

CIVILIAN COMPONENTS

Regulations Covering Reserve Retirement Pay Published

The Department of the Army has announced publication of special regulations 140-60-1 covering the requirements for non-disability retirement pay to members of the Organized Reserve Corps who have satisfactorily completed twenty years of Federal service in accordance with Public Law 810, passed by the 80th Congress.

These regulations will be the official guide to applicants and will be distributed to all Army installations, Reserve headquarters and Unit Instructors throughout the country.

Applications must be made on National Military Establishment Form 108 and sent to the Department of the Army for processing and verification. Application forms may be secured by addressing The Adjutant General, Washington 25, D. C.

Eligible Reserve personnel approaching age 60 are urged to apply for retirement 90 days prior to reaching their 60th birthday, so that the Adjutant General may process the papers and retire them the last day of the month they reach retirement age with payment to accrue the first day of the following month.

As of the first of the year, 1642 applications for reserve retirement pay had been received by the Adjutant General and the first fifty checks to qualifying Reserve individuals were mailed the first week in January.

NG Organizes 42 AAA Units

42 of the 123 Anti-Aircraft Artillery Battalions in the National Guard troop basis have completed organization. Radar and communications play an especially vital part in the activities of these units.

Federal recognition of Battery D, completed organization of the 272nd Anti-Aircraft Automatic-Weapon Battalion, Escondido, California.

Twenty National Guard Army units were Federally recognized during the week ending December 31. A total of 4,886 Army and Air units —78.8 per cent of the 6,194 allotted the postwar National Guard—now have completed organization.

A breakdown of National Guard unit organization showed 4,417 or 77.7 per cent of the 5,680 Army and 469 or 90.1 per cent of the 514 Air units in the Guard troop basis Federally recognized.

National Guard Officers To Retain Unit Status While On Active Duty

Under provisions approved by the Army and Air Force Chiefs of Staff, National Guard Officers may retain their Guard unit status while on extended active duty with the armed forces, the National Guard Bureau has announced.

As a means of checking permanent loss to the National Guard of experienced and valuable officer personnel, States now will be able to continue to carry officers called to extended active duty on the rolls of their units as extra to the table of organization positions. Their old positions, meanwhile, can be filled by other qualified officers.

Upon completion of his active duty tour the officer can immediately return to his National Guard unit and, if his old berth meanwhile has been filled, be carried as extra until regular table of organization position materializes there or in another unit.

Air National Guard Acquires Surplus Electronics Equipment

Electronic equipment has been obtained from the War Assets Administration for distribution to Air National Guard units in the United States, the District of Columbia, Puerto Rico, and Hawaii.

Made up of radio and radar receiver and transmitter component parts, power supplies and a large quantity of electronic spare parts, the equipment has been shipped to Griffiss Air Base, Rome, New York, for inventory, screening and processing.

It will be sorted for material suitable for use by the Air National Guard radar and communications network, for fighter and bombardment squadrons, Aircraft Control and Warning and Communication Units, weather stations and other units. Eventually the screened electronic material will be distributed among the several States, to be used for training of the Military Amateur Radio System of the Air National Guard and maintenance of equipment already on hand for which spare parts are not readily obtainable.

Equipment remaining after the screening for the Air National Guard will be turned over to the United States Air Force for use in their Air Reserve and Military Amateur Radio System Programs.

To date, approximately sixteen million dollars in radar and communications equipment has been issued to the 469 Federally recognized units of the Air National Guard.

Civilian Reserve Group to Train on Aircraft Carrier

Rear Admiral Richard F. Whitehead, Chief of Naval Air Reserve Training for the entire nation, announced that in the future several groups of civilian Naval Air Reservists throughout the country will participate in actual aircraft carrier training during their two weeks of annual training duty. The first group to participate in such training during 1949 will be an escort carrier group, CVEG-71, from the greater Chicago area under the command of Lieutenant Commander Richard K. West.

West looks upon the venture as a challenge which will prove conclusively the value of Naval Air Reserve Training. He cited the growth of Naval Air Reserve which, in less than three years of existence, has attracted a sufficient number of veterans and new enrollees to provide fifty-two aircraft carriers with flight and aviation personnel, in the event of national emergency. Other units which the Naval and Marine Air Reserve lists on its roster include seven Marine ground control intercept squadrons.

The Military Amateur Radio System

The first step toward the postwar renewal of traditional Army-amateur cooperation in a training program was accomplished in mid-December when the office of the Secretary of Defense announced the activation of the Military Amateur Radio System, for the present open only to amateurs in the military service or its reserves. MARS will be a joint project of the Air Force and the Army under the direction of Major General Francis L. Ankenbrandt, Air Force director of communications, and Major General Spencer B. Akin, chief signal officer of the Army.

Amateurs in military service, including those in overseas commands, or in the Organized Reserve Corps, National Guard or ROTC, are invited initially to apply for MARS membership to form a nucleus of a training project which, it is hoped, will soon be expanded to include civilian amateurs along the general lines of the prewar AARS. Application for membership may be made as detailed hereinafter. Commanding officers of each base, installation or other unit will, as soon as possible, each designate an officer to act as MARS director for his command.

The purposes of the Military Amateur Radio System are "to create interest and further training in military radio communication; to promote study and experimentation in military radio communication; to coordinate practices and procedures of amateur radio operations with those of military radio communication; and to provide an additional source of trained radio communication personnel in the event of a local or national emergency."

MARS will not operate on amateur frequencies. The System has obtained the use of special military frequencies for its drills—3497.5, 6997.5, 14,405, 20,995 and 27,995 kc.—and crystals will be supplied members. Time on these net frequencies is equally divided between the Army and the Air Force and will be further apportioned by Army areas

and Air Force Subdivisions, with ample time left on all frequencies for "free" net operation. Top-level net control stations are WAR for the Army and AF4AF for the Air Force, both located in the Pentagon Building in Washington, D. C.

For general amateur operation outside of drill periods, amateur stations at military posts are being assigned calls with a "K" prefix, a numeral coinciding with the FCC amateur call area, and suffixes of FFA through FZZ for the Air Force and WAA through WZZ for the Army. These calls are, of course, obtained by making the usual application on FCC Form 602. MARS member call signs will have an "A" prefix for Army and an "AF" prefix for Air Force. with numeral and suffix the same as the amateur call. Thus station K4AF becomes AF4AF when operating on MARS frequencies; W9USA would become A9USA when entering the regular Army net.

A considerable quantity of surplus electronic equipment has been allocated to MARS, to be made available to active and reserve units through usual channels, as specified in the joint announcement (SR 105-75-1 and AFR 102-3). The military proposes to sponsor amateur training in many types of communications and expects, for examples, that certain stations will conduct facsimile experiments on MARS frequencies and that MARS members, outside drill periods in amateur status, will enter 2-meter teletype nets. Amateur support will be asked in propagation studies, solving of u.h.f. communications problems, etc. A monthly bulletin to members will carry not only general news and operating notes but an occasional technical or construction article as well as antenna and propagation data. WAR will transmit an official bulletin each Monday simultaneously on 6997.5 and 14,405 kc., at 0100 and 0400 GCT.

An advisory committee is being appointed to assist the Chief Signal Officer and the Air Force Director of Comunications on matters of policy pertaining to MARS. Early appointments to this committee are expected to be Major Rawleign Ralls, W3RO, who has been designated MARS chief for the Air Force and Captain Edward Nielsen, W4ODI, MARS chief for the Army (Signal Corps). ARRL has nominated its communications manager, F. E. Handy, W1BDI, as one of the civilian members of the MARS advisory committee.

And now, here's how to address applications for membership, assuming, of course, that you're in the military service or the reserves and wish to become a "charter" member of MARS. In certain Air Force commands (FEAF, USAFE, SAC, AMC, ATC and ATRC) applications will follow command channels, addressed to the Commanding General of the particular command to which the applicant is attached, marked to the attention of the Chief, MARS. In other Air Force units and in the army the applicant will be governed by his geographical location, as shown below:

N. Y.
Vt.
N.H.
Me.
Mass.
Conn.
N. J.
Del.

First Army Headquarters
Commanding General, First Army
Governor's Island
New York, N. Y., Attn.:
Signal Officer
or
Commanding General
Headquarters First Air Force
Fort Slocum, New York,
Attn.: MARS, Air Force Director

Pa.
Ind.
Ohio
Kv.
W. Va.
Md.
Va.
D. C.

Second Army Headquarters
Comanding General, Second Army
Fort George G. Meade, Maryland, Attn.: Signal Officer
or
Commanding General, Headquarters 14th Air Force
Langley Air Force Base
Langley Field, Virginia,
Attn.: MARS, Air Force Director

Tenn.
N. C.
S. C.
Miss.
Ala.
Ga.
Fla.

Third Army Headquarters
Comanding General, Third Army
Fort McPherson, Georgia,
Attn.: Signal Officer
or
Commanding General, 9th Air Force
Greenville Air Force Base
Greenville, South Carolina,
Attn.: MARS, Air Force Director

Okla.
Texas
N. M.
Ark.
La.

Fourth Army Headquarters
Comanding General, Fourth Army
San Antonio, Texas, Attn.:
Signal Officer
or
Commanding General, 12th Air Force
Brooks Air Force Base
San Antonio, Texas, Attn.:
MARS Air Force Director

Wyo.
Colo.
Kans.
Neb.
Mo.
Iowa.

Letters TO THE EDITOR..

Sir:

I am not interested in Naval communications and as your magazine seems to cater to Naval communications I cannot see renewal justified. My observations are from reading your literature of the past year.

E. R. TROUT

Sir:

As a student member the only benefit derived from AFCA is the magazine. The AFCA should devote itself to a few technical articles in the magazine.

NORMAN F. PINEDD

Sir:

I have a copy of the January-February edition of SIGNALS before me and I am greatly impressed by the series of sparkling photos appearing on pages 13 to 16.

I have often thought of doing a pictorial story of Washington in the *U. S. Coast Guard Magazine* and, observing your Washington photos, I am prompted to inquire the name and address of the company that supplied the excellent Washington shots.

Incidentally, I am particularly interested to note that your January-February edition is printed on *'Printone'* paper. The *U. S. Coast Guard Magazine* will be printed on *'Printone'* commencing with our April edition and I only hope that our printers achieve as splendid a reproduction job as that done by your printers in your latest edition.

EDWARD LLOYD, Editor
U. S. Coast Guard Magazine

Sir:

. . . .your January issue of SIGNALS is the best you have published. Although that can be said of each issue as it appears, since I have noted a constant improvement. This issue, being devoted to pictorial activities, was of course of fundamental importance in my eyes, in that it placed the photographic on a level which I feel is merited by its present day significance. I anticipate that the response to this issue will be very complimentary to your efforts, and if this should prove to be true, might I go so far as to suggest the maintaining of an increased emphasis on this field in future issues.

CHARLES S. STODTER
Colonel, Sig. Corps
Commanding
Signal Corps Photographic Center

Sir:

Inclosed you will find my application for individual membership in the AFCA. Also a money order to cover my application fee.

As you know, Alaska is well on its way toward statehood, and a bill is already drawn up for the Territorial legislature on the proposed site of the constitutional convention to be held in Sitka.

When the Territory becomes a state it will depend more than ever before on radio comunications between the States and the Territory, for marine and air transport, as well as for the Army and Coast Guard.

The national security of the United States may depend on Alaska, therefore it is essential that we have the most up to date communications system available.

The Alaska Communications System, operated by the U. S. Army, is doing a swell job and is to be congratulated on its uninterrupted service.

A good example of Alaska Communications System's contribution to communications is the long distance phone service whereby we in Alaska may call most anywhere at cost, thus saving valuable time, and in some cases large expenses.

Since broadcast stations are few and far apart in the Territory most of us depend largely on shortwave reception from the States. Each and every owner of a shortwave receiver is very much interested in communications and ways and means of improving reception.

I sincerely look forward to receiving your bi-monthly publication SIGNALS, and am sure that I can secure future members for this educational organization.

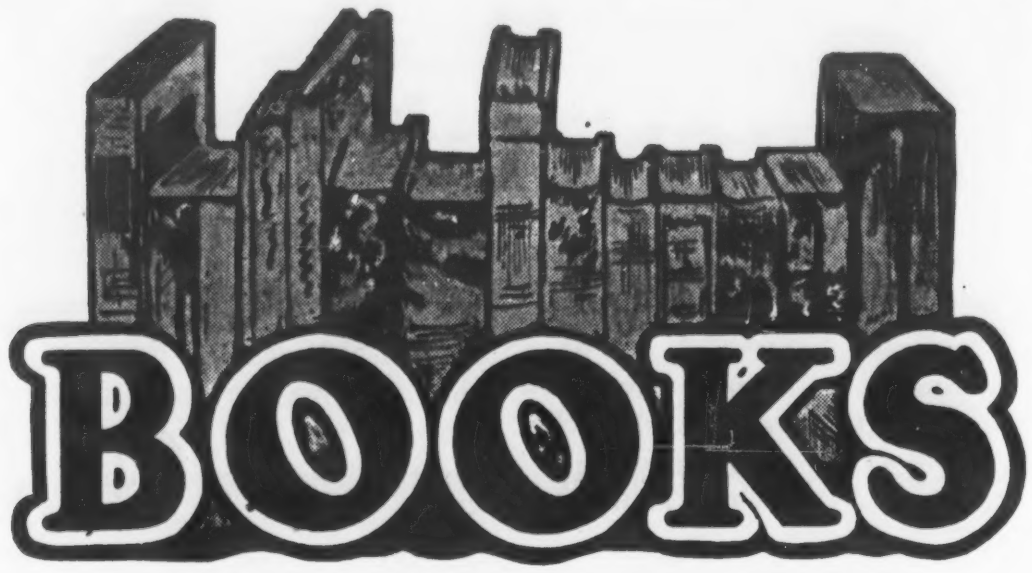
FLOYD P. BROWN, JR.
Sitka, Alaska

NEWS

N. D.
S. D.
Minn.
Wis.
Ill.
Fifth Army Headquarters
Commanding General, Fifth Army
Chicago, Illinois, Attn.:
Signal Officer
or
Commanding General, 10th Air Force
Fort Benjamin Harrison
Indianapolis, Indiana, Attn.:
MARS Air Force Director

Wash.
Ore.
Calif.
Nev.
Ariz.
Idaho
Mont.
Utah.
Sixth Army Headquarters
Commanding General, Sixth Army
San Francisco, Calif., Attn.:
Signal Officer
or
Commanding General, Fourth Air Force
Hamilton Air Force Base
Hamilton Field, Calif., Attn.:
MARS Air Force Director

Upon receipt of an inquiry for enrollment in MARS, the Signal Officer of the Army area or the MARS Air Force Director will forward application blanks to the applicant. When these are processed, a MARS call sign and net allocation will be made at the proper command level and a MARS certificate will be sent to adorn the walls of the "shack" alongside the FCC ticket. (Editors note: A special AFCA committee under George R. Call of Sioux City, Iowa. completed a study on the desirability and practicability of extending MARS so it will include Naval reserve amateurs as well as those not in the services. The committee's recommendation's appear in more detail in "Association Affairs".)



AND SERVICES

R. L. O'CONNOR, Secretary

OKINAWA: THE LAST BATTLE, by the Historical Division, Department of the Army. 474 pages. $6.00.

"OKINAWA: THE LAST BATTLE" is a vivid and accurate account of the climactic battle of the Pacific war. It begins with an outline of plans made by the Joint Chiefs of Staff, summarizes the tremendous array of fire power and shipping accumulated for the campaign, describes the landings, and recounts the three months of bloody fighting which led to victory in June, 1945. Though chief emphasis is placed on the ground forces, the sea and air battles which form an integral part of the effort are sketched in sufficient detail to afford a complete picture of Operation Iceberg.

The battle for Okinawa, which the Japanese defended as one of their "home islands," is packed with dramatic incident: the savage assaults of suicide planes; the landing of enemy raiders on the airfields; the loss of Ernie Pyle on Ie Shima; and the death in action of General Simon Bolivar Buckner, Commander of the Tenth Army, on the very eve of victory. But most dramatic of all was the relentless drive of American infantrymen and marines, pushing from hill to hill, forcing the enemy "with blowtorch and corkscrew" from his fortified caves in the coral rock. No battle has ever been recorded in greater detail, with frequent mention by name of individual soldiers engaged in acts of valor. A special effort is also made to give the background of important command decisions, some of them highly controversial; for example, the reasons for a frontal attack through the Shuri positions, as opposed to a second landing in the south, are here revealed for the first time.

Another notable feature of the book is the large attention given to the Japanese side of the picture. Through captured documents and interviews with enemy prisoners, the reader learns why the enemy commanders decided not to oppose our landing on the beaches but to concentrate their defense around the hard core of the Shuri fortifications. The Japanese counterattack in early May is told from the Japanese point of view.

"*Okinawa: The Last Battle*" is illustrated with more than 200 photographs, and the action is outlined on 54 maps which show in detail how the fighting developed. The appendices include troop lists, both American and Japanese, statistical charts and tables. Written by men who observed and participated in the action, this is a new kind of military history, written by the combat historian—one of the new developments of the late war. In addition to recording their own observations, these specially trained men held interviews with privates and generals alike, conferred with their colleagues in the Marine units engaged, and consulted a mass of Army, Navy and Marine records.

FREQUENCY MODULATION, VOL. I. RCA Review. 515 pages. $2.50.

A COLLECTION of 45 papers delivered by RCA engineers at various meetings or published in technical journals, this is the seventh volume of the RCA technical series. Due to the large number of papers, the FM art is covered—though possibly somewhat spottily—almost completely. The papers deal with problems in both FM reception and transmission.

There are two appendices—a bibliography of technical papers by RCA authors from 1936 to 1947 and a guide to a series of articles in *Broadcast News* on FM station placement and field survey techniques.

ANTENNAE, An Introduction to Their Theory, by J. Aharoni. Oxford University Press. 265 pages. $8.50.

A COMPLETELY mathematical treatment of the subject, this book is divided into three parts, Antennae and Boundary-Value Problems, Antennae and Integral Equations and Antennae as Wave Guides. A number of references—both books and papers—are given at the end of the text.

UNDERCOVER GIRL, by Elizabeth P. MacDonald. The Macmillan Company. 305 pages; $3.00.

LIEUTENANTS often turn pale when they carry the documents from one file to another. Colonels may gloat over being included on the circulation list of highly classified papers. Generals sometimes make a full-time job of paraphrasing each other's ideas in immaculate mimeographing. Tremendous things are in the air! Such is the idea held by too many officers of the Military Establishment about present-day psychological warfare. Everybody, including Drew Pearson, says we ought to get busy at it. But do we do it? We ain't saying.

In the sadly overclassified field of psychological warfare, very little was as heavily classified as MO—morale operations, or "black propaganda." (To find out exactly what that is you will either have to get this book or buy my own book from the Infantry Journal Press, which published it. Psychological Warfare. $3.50. Autographs free. Not an advt.) American "black" propaganda was classified very highly during the war. Since it was never released to the U.S. public, presumably it still is.

Do you get that point? Classified? Still classified, very much so? Fine.

Well, this MacDonald girl appears to have skimmed the whole lot of it—names, dates, places, operational review, evaluation, echelons, basic doctrine. She has printed it. College professors can't get it, if they want to write books, Historians can't get it. Newspapermen can't get American "black propaganda." Nobody can get it.

Except, it would seem, here.

Just in case anyone, including the Tass news agency or the Red Army general staff, had doubts about this being the McCoy or the MacDonald, General "Wild Bill" Donovan wrote a preface to this book in which he endorses it. Some day a security officer in nameless buildings of nameless agencies is going to realize that not all the world is mimeographed and numbered, and is going to wake up to the fact that a statement of MO doctrine thus endorsed, is on sale at $3.00 per copy.

The book itself is deceptive. It is told on a uniform level of vehement feminine humor. Miss MacDonald practically splits a gut trying to be one of the boys and sometimes the jovviality is wearing. But underneath the fluffyduffery, the personal anecdotage and the no-extra cost travelogue stuff Miss MacDonald packs a wallop of doctrine. She points out the limitations of the function, shows how we faked Japanese documents, goes into specific techniques for corrupting enemy morale and snafuing hostile strategy, and describes how personnel limitations were overcome.

If a stranger tried to write this book

—a good patriotic American newspaperman or retired officer or psychologist—and went down and asked nicely for the materials, he could wait until four inches of ice covered Hades before he saw any of the documents which Miss MacDonald describes in her book. Generals Brereton, Eisenhower, Stillwell and Patton have given their inside stories of the war; Secretaries Stimson and Hull have done so; the Harry Hopkins estate is making a pot of money out of classified documents which would have gotten you or me in jail if we had tried to borrow them for our memoirs. And any day now, it seems almost possible, General Zilbert K. Zooch may sell the whole blessed files of the Manhattan Project to some syndicate as a comic strip. Individuals can apparently talk all they want to, but the documents—God bless their little hearts—remain classified. Print them. And they're still classified, for all I know.

If you don't believe me, ask the Army or the Navy for copies of some of the stuff Miss MacDonald prints. Or even better, ask Miss MacDonald. At page 205 of a book dedicated to the ultra-hush topic of MO, she blithely remarks: ". . . We had been warned to keep MO hush-hush."

The reviewer would worry about reviewing this "classified" book which Macmillan sells for three bucks, except for his staunch conviction that the security people most concerned never—no, no, never—read anything which is not marked classified. Hence they won't see this issue of the *Infantry Journal* unless a copy is brought back from the upper Lolo country, photographed, stamped *DREADFULLY SECRET*, and shown only to those officers of the class of '26 whose first names include two vowels.—*P. M. A. Linebarger.*

GUARD OF HONOR, by James G. Cozzens, Harcourt-Brace, 631 pp. $3.50.

THIS books will appeal to you especially if you served at Drew Field or other large Air Base during the war, particularly if it was located in Florida. It is a book with Army and Air Force characters that does not make you grind your teeth at its absurdities and half-truth observations. It is a book that shows the living Army as it was in World War II; a book you would read, saying page after page, "That's actually the way it goes, I have seen it myself."

Some good novels have been written with a U. S. Army background but very few about the World War II Army and Air Force. None of these comes anywhere near the startling, intense and minute accuracy of *Guard of Honor*. As a matter of fact, in this reviewer's opinion, the book goes entirely too much into detail and therefore drags in spots. It would be a better book if it had only a little over 300 pages rather than 631. But *Guard of Honor* is especially accurate in every respect and an exciting, first-rate tale in the bargain. It deals with the happenings of three days—three tense, full, long days and nights in 1943 at Ocanara—a huge and special AAF installation in Florida.

Some of the characters are: Bus Beal, 40-year-old Major General, commander of the big installation of Ocanara, West Pointer, veteran of the first Philippine campaign under MacArthur and Wainwright, able, still on the way up because of his leadership and quick mentality but not an empire builder, hasty but square, not too strong in his kindness in dealing with those around him who rank him on the permanent Army list.

But the real hero is Colonel Ross, nearly 60, bothered with a heart condition, inspector of the Ocanara command. Like so many hundreds of other mature, patriotic Americans over 45, he left his home and business when he saw that the service needed him during his country's emergency that began in 1940. A noted attorney and judge in

INSIGNIA OF THE ASSOCIATION

AVAILABLE TO MEMBERS FROM THE SERVICE DEPARTMENT

The insignia of the Association in several beautiful designs and convenient styles authorized for wear by members is available at the prices quoted below. The insignia is described as follows:

The central figure is an alert powerful American eagle with strong talons clutching lightning flashes—symbolic of a strong America and national defense—especially insofar as modern communications is concerned, our basic reason for existence. The border consists of leaves of the olive branch of peace, showing that the object of military preparedness in America is to assure a lasting peace. In the background are signal flags—the first means of signalling in sea and land warfare by United States forces. Just above the eagle and between his outstretched wings is a heavy bomber in flight, symbolizing the complicated and essential communications in the Air Force, and in Naval and Marine aviation. Above that is a radar antenna array, and at the very top a radio relay antenna—for the latest major step in military communications. And none of these could exist without industry—the foundation of AFCA. In the color version there are the additional colors of the signal flags—dexter white with red center and sinister red flag white center—with a gold border to the whole.

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civilian life, his fine mind and character are recognized by General Beal who leans on him more and more for mature advice.

....*Guard of Honor* is most likely to become a best seller. Comparison with *Command Decision,* the finest book on Air Force operations to come out of the war so far, is inevitable. Personally I think *Command Decision* a much better book, perhaps because it treats of Air Force combat action of heavy bombers based in England.

THE GERMAN GENERALS TALK, by B. H. Liddell Hart (Wm. Morrow, $4.00).

The well known British military commentator, B. H. Liddell Hart, gives herein a vivid first-hand picture of Hitler's military attainment as seen by his senior generals. Two-thirds of this compact volume are devoted to the opinions and criticism by many top German generals on the events of World War II.

Beginning with a concise description of the resurrection and training of the German Army during the years before Hitler, the author traces the influence of Hitler and the Nazi Party on the subsequent development of the Army and its General Staff. Since these accounts are based on long talks with captured German generals, they represent recent history from a German point of view. As such they have historic value even after official documents are published.

Perhaps the most interesting parts of the book are the characterizations of Hitler as a general by his military leaders. Outstanding among these is the one by Kurt von Manteuffel, one of the best young generals, who commanded the Fifth Panzer Army during the Ardennes offensive. Manteuffel is reported to have said of his Fuhrer: "Hitler had read a lot of military literature and was also fond of listening to military lectures. In this way, coupled with his personal experience of the last war as an ordinary soldier, he had gained a very good knowledge of the lower level of warfare—the properties of the different weapons; the effect of ground and weather; the mentality and morale of troops . . . on the other hand he had no idea of the higher strategical and tactical combinations. . . ."

"Moreover, he had a tendency to intoxicate himself with figures and quantities. When one was discussing a problem with him, he would repeatedly pick up the telephone, ask to be put through to some departmental chief and ask him: 'How many so and so have we got?' Then he would turn to the man who was arguing with him, quote the number, and say: 'There you are'—as if that settled the problem. . . ."

Hitler's flagrant misuse of his air weapon would refute Hart's conclusion as to Hitler's ability to be "quick to spot the value of new ideas, new weapons. . . ." The opinions of top German Air Force generals, many of whom were available at the war's end, could have helped to round out this appraisal of Hitler's attainments as a military strategist.

In spite of these shortcomings this volume represents an excellent source of material for the military student. It is easy to read and contains many lessons, not least of which are the limitations imposed by a police-state dictatorship on the military conduct of a major war.

In common with many recent studies on the aspects of World War II, Liddell Hart's book strengthens the conviction that modern warfare, in spite of its high degree of technological development, depends on human evaluation and human decision for its successful employment.—*Air University Quarterly.*

RADAR SCANNERS AND RADOMES. (Massachusetts Institute of Technology, Radiation Laboratory Series, number 26.) Edited by W. M. Cady, M. B. Karelitz, and L. A. Turner. McGraw-Hill Book Company, New York, N. Y. 491 pages. Cloth, $7.00.

The first part of this book takes up the problems of mechanical and electrical engineering and of servo design which underlie the design of scanners for practical radar sets. Land-based, ship-borne, and air-borne scanners are treated, and gyroscopically-controlled antenna stabilization discussed. The second part is devoted principally to the practical mechanical, electrical, and aerodynamic problems of the design of radomes (housing for scanners), including discussion of the properties of the most useful materials, and some developments of the theory of the effects of such housings on the radiated waves. —*Electrical Engineering.*

BATTLEFRONTS OF INDUSTRY, WESTINGHOUSE IN WORLD WAR II, by D. O. Woodbury. John Wiley and Sons, Inc., New York, N. Y. 342 pages, $3.50.

THIS book, which shows how American industry worked during the last war, is primarily the story of Westinghouse's contributions. Such products as electric torpedoes, jet propulsion units, and atom bomb manufacturing equipment are considered. Two chapters on fissionable materials are included.

I CAN HEAR IT NOW. Record Album, Columbia, LP $4.85 and regular $7.25.

WORLD WAR II soldiers of Camp Kohler and Drew Field will remember dynamic Fred Friendly, the sergeant in charge of "orientation." Recently he collaborated with two others (one of them CBS's Edward R. Murrow), in preparing a recording of extracts from the great broadcasts of the 13 years from 1933-1945. The album opens with Franklin Roosevelt's 1933 inaugural address ("The only thing we have to fear is fear itself.") and closes with General MacArthur's signing the peace on the *Missouri,* September 2, 1945. 51st Sig Bn soldiers who were called to Lakehurst for the *Hindenburg* disaster in 1937 will be impressed especially with the broadcast that night—the most harrowing single item in the album. President Roosevelt is heard more than any other individual. But there are Churchill, Neville Chamberlain, Eisenhower on D-Day, Hiroshima, Lou Gehrig, Max Schmeling, Lindbergh, Hitler, King Edward VIII giving up his crown for "the woman I love," Mussolini—in fact all the famous voices of those history-making thirteen years. A never-to-be-forgotten record of those stirring years that every American should have.

CORAL & BRASS, by Lieutenant General Holland M. Smith, Marine Corps. Chas. Scribner Sons. $3.00

The Infantry Journal has been carrying a series of articles about Army and Marine fighting in the Pacific in World War II, with an analysis of the overall situations in explanation of Marine General Smith's articles in *Saturday Evening Post,* now appearing in greatly expanded form in the book "Coral & Brass." The *Journal* emphasizes what has long been obvious—that the Army suffers through entirely too much modesty in publicizing its wonderful and tremendous accomplishments in World War II and in earlier wars.

Let's hope the *Infantry Journal's* articles will result in a bolder approach and a fierce pride in its accomplishments by the Army. Copies of the *Journal* articles will be secured for our members on request, at 50c each.

MULTI-CHANNEL RADIO-TELEGRAPH SYSTEM FOR HIGH-FREQUENCY CIRCUITS, by Thomas E. Jacobi. Engineering Products Department, RCA Victor Division.

SUMMARY—In field tests of a number of frequency-division multi-channel radio telegraph systems for use in the high-frequency range (3 to 30 megacycles) it was found that frequency-modulated subcarrier channels in conjunction with single sideband and space diversity provided the best method of transmission of those tried. Error rates of 0.02 percent to 0.14 percent were obtained on a transcontinental circuit. Furthermore, frequency spectrum and transmitter power are utilized most efficiently. Conventional double-sideband circuits proved unsatisfactory because of high error rates during periods of selective fading. If exalted-carrier receivers are used in the double-sideband circuit, the error rate can be reduced to the same magnitude as that for a single-sideband circuit; however, the other two advantages of single-sideband previously referred to are still lost. Because of the steadily increasing congestion in the high frequency range, methods of reducing spectrum usage and increasing message capacity are considered of paramount importance. *RCA Review,* Dec. 1948.

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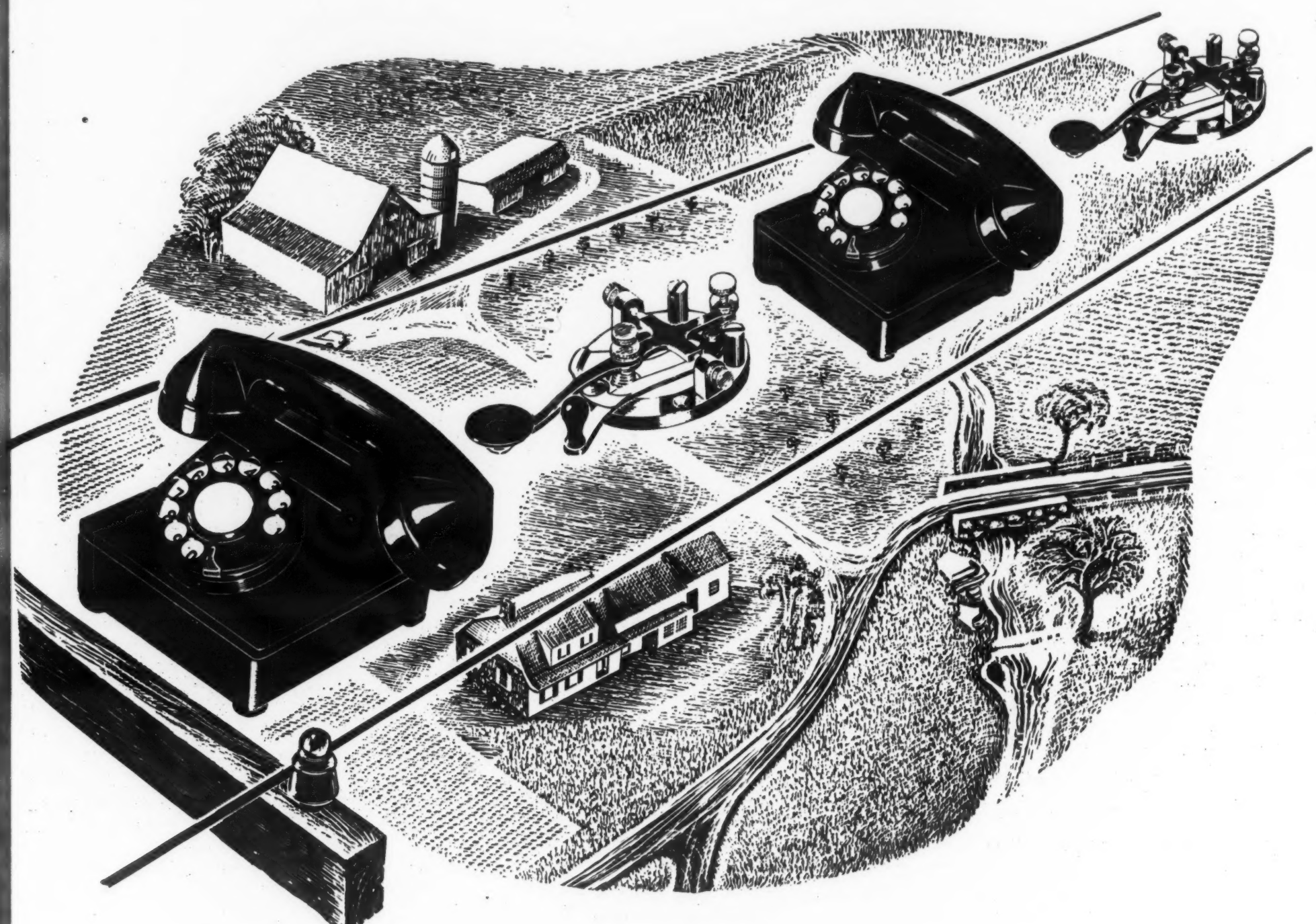

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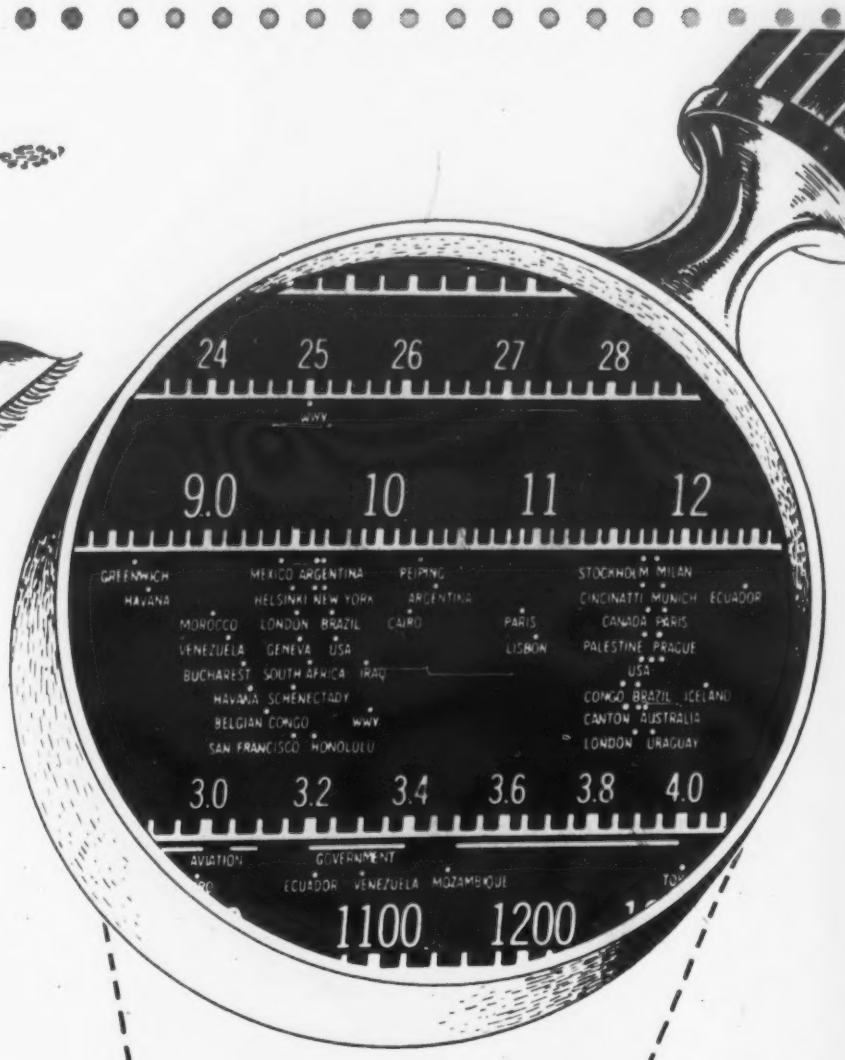

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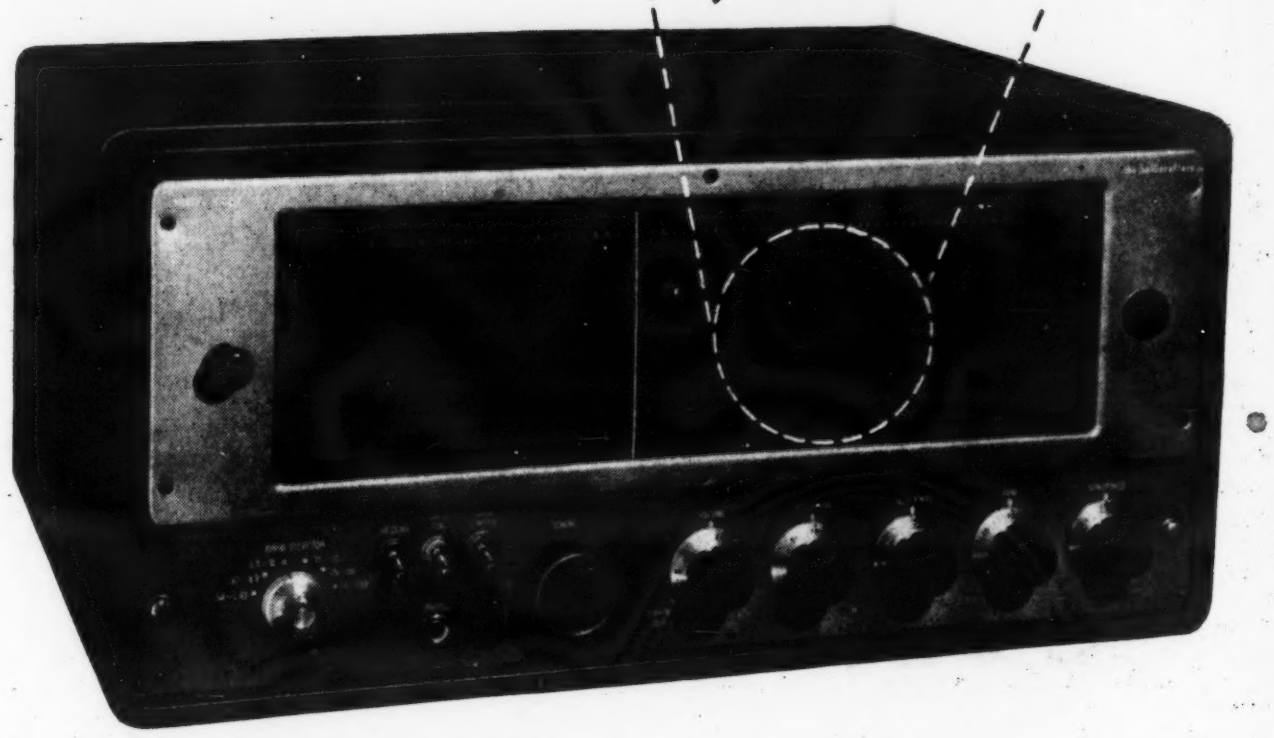

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